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EMPLOYMENT, INCOME, AND RETIREMENT PROBLEMS OF THE AGED

Edited by
Juanita M. Kreps

EMPLOYMENT, INCOME, AND RETIREMENT PROBLEMS OF THE AGED

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DUKE UNIVERSITY PRESS
Durham, North Carolina
1963

© 1962, 1963, Duke University Press

Library of Congress Catalogue Card No. 63-17325
Cambridge University Press, London N.W.1, England
Printed in the United States of America

362.6
K92E
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The bulk of the research as well as the publication of this volume of essays was financed by a Ford Foundation grant for socio-economic studies of aging.

PREFACE

The significance of the economic position of the aged has long been recognized by students whose research in aging fell primarily within the framework of other disciplines. Sociological and psychological studies, in particular, have revealed the extent to which the individual's attitude toward aging is conditioned by his job status and by his degree of economic security. Although evidence on the relation between the size of retirement income and adjustment to retirement is still fragmentary, there can be little doubt that many of the medical, psychological, and sociological problems now confronting the aged are contributed to, in considerable measure, by the sharp drop in income accompanying withdrawal from the labor force, as well as to the loss of job status. Since their health and well-being are so intimately bound up with their economic position, future plans for meeting the needs of the growing number of aged persons of necessity require estimates of job availability and potential retirement income.

In the ensuing studies the authors have analyzed some of the recent economic developments which are of particular significance to older persons, and on the basis of these analyses they have drawn conclusions of some import not only to the aged population, but to the nation as a whole. Population aging since 1850, Professor Spengler points out, has been associated almost entirely with decline in fertility and natural increase; increase in the average duration of life and even prolongation of life among those over 50 has exercised little influence on the course of aging. Accordingly, aging of a population does not tend to be accompanied by an increase in the ratio of the population's dependency burden to its capacity to support such burden, since the increase in the number of persons aged 65 and over is offset by a decrease in the number under 15 and an increase in the number aged 15–64. His conclusion that per capita income is determined, not by age structure as such, but by the size and allocation of income, by tastes, and by the emphasis put on growth, points up the relevance of the second study—an analysis of postwar growth in national output by industrial sector. Projecting these rates of growth to 1970 and 1975, the authors provide rough estimates of the economy's future labor requirements, which are then compared with the anticipated labor force. Against this background of economy-wide employment trends, Professors Kreps, Ferguson, and Folsom then review changes in employment and earned income of older persons, giving particular attention to the changing industrial composition of older worker employment.

Subsequent studies examine the possible effects on income, welfare, and productivity of a policy of flexible retirement, which would permit individual choice in the selection of the time a pension is to begin. The impact of pension funds on national income, consumption, interest rates, and the national wealth is also analyzed, and important questions are raised regarding the effect of pension funds on aggregate saving and interest rates. The final study describes the main threats to the economic security of the aged, and suggests one possible plan whereby the aged might share in the increases in national output which occur in a technologically progressive economy.

In summary, the authors have been concerned primarily with recent trends in income, employment, and labor force size, and with the relation of these trends to the changing age structure of the population. No attempt has been made to provide comprehensive analysis of all the economic problems which are emerging; rather, this work supplements the growing body of research reports to which persons of several disciplines have contributed.

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EMPLOYMENT, INCOME, AND RETIREMENT PROBLEMS OF THE AGED

Juanita M. Kreps

I. INTRODUCTION: A PREVIEW OF THE PROBLEMS

Recent attention directed toward the economic problems of the aged has resulted in a great many studies of employment and retirement problems, income levels, expenditure patterns, housing and medical costs, and other aspects of the aged's particular position. Research thus oriented toward the economic status of older people has succeeded in pointing up the needs of this group and in awakening the public to its responsibility for more liberal social policy. But at the same time there has been less study and research devoted to the broader economic problems which are emerging with the changing age composition of the population. These problems are not peculiar to older people; they affect the whole economy. Involuntary retirement and reduced income at the age of 65, for example, are first and foremost the problem of the retiree. But his withdrawal from the labor force also affects the total product, the income and the growth of the economy as a whole.[1]

Moreover, retirement policy seems to depend primarily on the state of the economy, rather than on the attitude of the particular employer or the ability of the individual employee. Consider briefly the evolution of retirement policy, and the possibility that the decade of the 1960's may bring us full circle. In contrast with the depression era of the 1930's, when compulsory retirement was viewed as a means of rationing jobs, flexible retirement in the 1940's and early 1950's reflected instead the conditions of an extremely tight

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1. See Duke University Council on Gerontology, *Proceedings of Seminars* (1959–61), pp. 109–122.

labor market. Gradually, some of the labor market pressure to retain workers past the age of 65 disappeared, as the recessions of 1957–58 and 1960–61 brought serious levels of unemployment. Other pressures for flexible retirement have continued, however. The rapid growth in the number of persons reaching the age of 65 has been accompanied by mounting evidence as to the ability of many of these workers to continue to perform competently on the job. Coupled with these two developments is the low-income status of the retiree, which compels attention. The most obvious solution to the income problem is continued employment.

But the problem of retirement policy in the present decade has to be posed in a somewhat different context, for developments in both demand for and supply of labor focus attention on economy-wide phenomena. On the demand side, the rapid mechanization of certain industries has raised the question of the ability of other sectors of the economy to absorb displaced workers. On the supply side, the rate at which new entrants into the labor force swell the labor market each succeeding year raises the even more difficult question of balancing total labor requirements with total labor supply. Retirement practice, then, could come to be viewed as one of the measures by which the balance is maintained, and if so, the movement will surely be toward retirement before, rather than after age 65. One of the crucial areas to be explored, therefore, is the industry-by-industry development of automation and the possible accompanying job displacement.[2]

Studies of retirement also concern themselves with the twin problems of *how much* leisure can (and must) be taken by the worker, and *when* that leisure is to be taken. For example, one may take his leisure in the form of an extended period of education, thereby entering the labor force later. Or leisure may be taken in the form of a reduction in the number of hours worked per week, or again, in earlier retirement. From the individual's point of view, the optimal solution is doubtless a combination of all of these. However, recent governmental action has indicated movement in only one of these directions, that of increasing the time spent in retirement.

The studies which follow, dealing with various aspects of the problems arising with the changing age structure of the population, comprise five major units: one, a study of the mechanics, the development and the impact of aging populations; two, a series of three articles dealing with the extent and nature of the retirement problem, particularly as it is related to unemployment; three, an appraisal of the economic consequences of flexible retirement in the United States, and a review of flexible retirement policies abroad; four, an essay setting forth some of the financial dimensions and effects of pension-fund growth; and fifth, an analysis of the underlying forces which have relegated the aged to an inferior economic status, and a proposal for improving this status.

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[2] See Margaret S. Gordon, "The Older Worker and Retirement Policies," *Monthly Labor Review*, 83 (1960), pp. 577–585, and Juanita M. Kreps, "A Case Study of Variables in Retirement Policy," *Monthly Labor Review*, 84 (1961), pp. 587–591.

The first paper has to do with the mechanisms that bring about an increase in the relative number of aged persons in a population, and with the historical emergence of and some of the conditions associated with an aging population. In distinguishing between the incidence of mortality change and that of fertility change upon age composition, Professor Spengler concludes that decline in mortality has little effect upon population aging, at least as long as life expectancy does not exceed 70. Decline in fertility (i.e., in the Gross Reproduction Rate) , on the other hand, exercises a very great influence upon a population's age distribution—so much influence, in fact, that one can attribute the post-1850 aging of populations almost exclusively to decline in fertility.

In the past century mortality declines have usually decreased the median age of the population somewhat, and have decreased the proportion of the population aged 65 and over in half the cases studied. The age-reducing effect of mortality declines among those aged under 5 has more than offset the age-increasing effect of mortality declines among those over 50, while the probability of survival has increased much less and in similar proportions among those aged 5–50. Mortality improvements have therefore produced a younger population than would have resulted from unchanged mortality.

By contrast, fertility-reducing forces make for population aging because they reduce the rate of population growth and the rate at which births flow into the lower age groups. In consequence, younger cohorts no longer exceed older cohorts so markedly, if at all, in size. As a result, the median age of the population rises, the age distribution itself becomes less favorable to fertility, and the relative number of persons aged 60 and over increases. A rise in fertility produces the opposite set of effects.

Although the impact of net migration on the age distribution of the United States' population was significant during the period of heavy migration, the influx of migrants into the United States as well as into many European, Latin American, and Asian countries is now too small to affect the aging process notably. Studies relating to the present century reveal that migration has had little effect on population aging.

The world may be described as divisible roughly into two sectors, one in which fertility remains high and the relative number of older persons is quite low, and the other in which fertility is relatively low and the relative number of older persons is large and rising. In 1950 in Africa, Asia, and Latin America, for example, only 4–6 per cent of the population were 60 and over. In Europe, Northern America, and Oceania the corresponding fraction was 11–12 per cent, and in the USSR it was 8 per cent and rising.

No substantial change in these proportions is likely, given current fertility trends. The tendency of fertility to fall remains weak in Asia (except for Japan), in most of Africa, and in much of Latin America. Furthermore, gross reproduction in the rest of the world seems unlikely to rise appreciably. It has been estimated, therefore, that as of 1975 only 5–6 per cent of the population of Africa, Asia, and Latin America will be 60 and over. In Europe, Northern America, and Oceania, by contrast, the corresponding percentages will be 17, 16, and 14, respectively. It will approximate 11 in the USSR and 11.6 in Japan. In the United States, where the proportion aged 65 and over rose from 3.4 in 1880 to 8.1 in 1950, the figure will advance to between 9 and 10 per cent by 1980 if the G.R.R. remains within the range 1.9–2.0. It could approximate 10.5 per cent if, as seems unlikely, the G.R.R. moved to 1.3. Should life expectancy increase more than these projections presuppose, the fraction would be slightly higher at given fertility levels. If our population continues to grow 1.5–1.6 per cent per year, and hence numbers about 350 millions by the year 2000, the 35 million persons 65 and over in prospect 40 years from now will form about 10 per cent of the population.

Population aging does not tend to be accompanied by an increase in the ratio of the population's dependency burden to its capacity to support such burden, even under *ceteris paribus* conditions; for increase in the relative number aged 65 and over is usually accompanied by decrease in the proportion under 15, and by increase in the proportion 15–64. Only if fertility is very low and life expectancy rises much above present levels is there a tendency for the ratio of persons of dependent age to persons of productive age to rise. Moreover, the movement of per capita income is determined predominantly by circumstances other than changes in age composition, and the real cost of providing support for persons of dependent age is determined largely by circumstances unconnected with age structure as such—that is, by the level and distribution of income, by the pattern of tastes, by the emphasis being put upon economic growth, etc. Finally, Professor Spengler points out that while it is very easy for a low-fertility population to introduce economic measures which offset increases in the relative number of persons aged less than 15 or more than 64 years, it is not easy for a high-fertility population to take countervailing measures. The latter has little recourse except to reduce its fertility.

Growth in the numbers of persons aged 65 and over in the United States has focused attention, first and foremost, on the employment opportunities offered these persons. The prospect for employment of older workers, being only a part of the long-run expectation regarding the demand for all labor, is largely dependent on the rate of economic growth. But while the expected rate of growth is an important factor, the growth rate alone does not explain changing employment. A study of the growth in the *size* of total product must be accompanied by a study of changes in the *composition* of that product. A change in the composition of demand for goods and services may lead to a substantial decrease in the aggregate demand for labor, for example, when there is a shift from goods requiring relatively large amounts of labor to goods which are produced in almost completely mechanized plants. Or industrial shifts may occur which result in the use of less labor of a particular age group. A reduction in the relative importance of farming, for example, has reduced employment opportunities for older men.

Estimates of future labor-force requirements which rely on a straightforward extrapolation of the trend in gross national product fail to take into account two important factors: one, changes in the composition of aggregate demand, and two, differential rates of productivity increase within the various output sectors. In attempting to incorporate these features in employment forecasts, the first study by Professors Kreps, Ferguson, and Folsom, makes separate projections of income originating in each of the sixty-two sectors of the economy corresponding to the National Income Division industrial classification. Dividing projected sector income by the projected average output per worker per year, one obtains an estimate of the number of workers which will be required by that sector in the terminal years 1970 and 1975, on the assumption of a continuation of the present workweek. Aggregation of these individual estimates yields an estimate of the total labor-force requirement at the selected future dates. This estimate of the demand for labor is then compared with existing projections of the labor force available in 1970 and 1975.

The forecasts of employment for 1970 and 1975 emphasize two major points: one, the differential rates of growth in both income by sector of origin and in average output per worker in the various sectors, and hence the changing industrial composition of employment; and two, the probable imbalance between the labor force and the aggregate demand for labor at the selected future dates.

Summarizing the intersectoral employment comparisons, the authors find that employment during the 1960's is expected to *decline* in three broad industrial sectors: Agricultural and Extractive Industries, Construction and Manufacturing, and Transportation; that employment should increase slightly in three other sectors: Trade and Finance, Utilities and Communication, and Service Trades and Recreation; and that employment will grow rapidly—in fact, will almost double, by 1975—in two sectors: Professional Services, and Government and Government Enterprises. Thus, a decline is expected in the relative importance of all major industrial classifications except Professional Services and Government.

Turning to the question of the over-all balance of labor supply and labor requirements (and subject to some qualifications), the authors' projected rate of unemployment is about 8 per cent for 1970 and about 10 per cent for 1975. Although one may discount heavily the value of any projection as remote in time as 1975 and consider only the 1970 estimate, a review of the growth of unemployment since the end of World War II reveals an upward trend of some significance. A continuation of such a "stairstep effect" as we have experienced since 1947 makes the possibility of 8 per cent unemployment appear less unreal, although no less alarming.

The comparisons afforded by this study are, of course, made with respect to the projected pattern of demand for and supply of all labor; these projections are therefore concerned with the employment prospects for older workers only within this context. But the implications for older workers are obvious. The long-run decline in labor-force participation rates of older men has been interrupted in recent decades only by the sharp increase in demand for labor during World War II, after which the rate resumed its downward trend. Furthermore, in the growing residue of unemployment left by the recessions of 1957–58 and 1960–61, the older worker has been particularly prominent. A projection of future labor requirements which falls considerably short of the projected labor supply raises the question of adequate job opportunities for all workers; but the question is of particular significance to the older, and apparently marginal, worker.

Within this context of total employment prospects, retirement policy is of paramount importance. Recent governmental action designed to permit earlier retirement of men reflects a recognition of the growing imbalance between the size of the available labor force and the aggregate demand for labor services. As an alternative to policies of retirement before age 65, or mandatory retirement at 65, reductions in the size of the labor force could also be achieved through reductions in the length of the workweek (as some unions have urged in recent negotiations), or by postponing entrance into the labor force through an extension of the number of years spent in school. Either type of policy would shift the initial cost of unemployment somewhat, but its final incidence might not be noticeably different from what it is at present. The choice of policy is a choice governing *when* society wants to take an apparently increasing amount of leisure.

Policies designed to reduce the size of the labor force approach the problem from only one side. A more attractive solution—on the assumption that, for the moment at least, we seem to prefer goods to leisure—lies in the possibility of stimulating the demand for labor through an increased demand for goods. Demand for goods from the public sector would meet obvious needs, and the demand for goods consumed privately is for a majority of families limited only by income. The extent to which a given increase in demand for goods leads to an increased demand for labor, however, is largely dependent on the composition of the augmented final demand. An increase in demand for educational or medical services, for example, constitutes a direct demand for the labor involved. On the other hand, an increased demand for manufactured goods may lead to proportionately much smaller increases in the demand for labor. Increased demand for the latter category of goods, most of which are produced under progressively more highly mechanized conditions, may be met primarily through a fuller utilization of existing capital facilities, with only a relatively small increase in the amount of labor employed. Thus, in order for the demand-creation policy to be effective, it may be necessary either to provide quite a substantial stimulus to the demand for goods, or else for the composition of this demand to be directed toward goods which, being less subject to the march of technology, continue to use relatively large amounts of labor. The possibility of maintaining a balance between labor supply and total labor requirements through increases in demand for manufactured goods appears less promising than in the past.

Employment opportunities for older workers, in particular, are discussed in the second article by Professors Kreps, Ferguson, and Folsom. The authors are primarily concerned in this study with trends in the employment and earned income of older workers, by industrial sector, in the years 1949–57. The relatively high level of economic activity, which apparently improved job opportunities for older workers from 1949 to 1956, was not maintained during the remainder of the decade. Between 1957 and 1960, the number of persons aged 65 and over with OASDI covered employment fell; the total number of older workers was approximately the same in 1960 as in 1950.

Employment of covered older workers showed the least growth from 1949 to 1957 in Manufacturing (except for Mining, which is a declining industry). As a consequence of differential rates of industry growth, as well as changes in coverage, three industrial sectors —Manufacturing, Wholesale and Retail Trade, and Services— each employed approximately one-fourth of all covered older workers in 1957, in contrast to their 1949 proportions of 41.7 per cent, 24.4 per cent, and 12.1 per cent, respectively.

Since the number of covered older workers increased between 1949 and 1957, their aggregate earnings increased also. The average taxable earnings of all covered wage and salary workers aged 65 and over increased from $1625 in 1949 to $1863 in 1957, with a high of $1961 during the Korean War. When deflated for price changes, however, the average earned income in real terms declined by about 3 per cent.

The failure of older workers' earnings to keep pace with those of younger workers is partly explained by the changing industrial composition of older-worker employment. As employment opportunities in Manufacturing, the highest paying sector, have declined, the proportion of the total aged work force employed in Services, the lowest paying sector, has increased. In addition to this shift, which is accompanied by some decline in average earned income, the older person's opportunity for finding or retaining a job appears to be better in those industries which are growing less rapidly than the national average, or which are actually declining. Further deterioration in the earned income position of the older worker is explained by the increasing proportion of women in the older work force. A continued shift of demand from goods to services is likely to bring with it a growth in demand for female personnel that is greater, relatively, than the demand for male employees. Such a shift in demand will bring further declines in the average earned income of older workers, since the movement will be toward both a lower paying industrial sector and the lower paid sex.

In summarizing the results of their two studies, the authors pose two questions: one, what size labor force will the economy require in the decade ahead? And two, what will be the age composition of the labor force? The conclusion that the labor force requirements of an economy which is rapidly mechanizing are likely to fall short of the labor supply of an economy whose available labor force is expanding in size is clearly justified, although measurement of the extent to which labor requirements will fall short of labor supply at some future date is, of course, difficult. If past trends do in fact continue, thus dictating within broad limits, at least, the answer to the first question, attention must be directed to the issue of labor force age composition. This question of which age group is to be given preference in the job market involves important issues of resource allocation. To what extent, and under what economic arrangements, are the nonworking members of society to share in the total output?

In an economy which allocates total product primarily to those members of society currently engaged in production, there is great incentive to enter the labor force early and to retire late in life. The incentive to join and remain a part of the labor force could be weakened significantly, however, by a change in the pattern of distribution of the nation's total output. If lifetime earnings were spread more evenly over the life span, rather than being concentrated in the working years, a different attitude toward labor force participation would surely evolve. Hence, an increase in OASDI benefits (financed by an increase in taxes) should weaken the reluctance to retire, and subsidies to education and training programs for young persons should give the high-school graduate greater incentive to lengthen his period of job preparation.

In both cases, the effect is a redistribution of the national product away from the current labor force toward nonworking members of society. But whereas the issue of raising retirement income via the tax mechanism is a question of income allocation, the maintenance of full employment is a problem of inducing a higher level of output, which in turn can be distributed in whatever manner society chooses. And although the case for income maintenance throughout the life span, rather than income maximization during the working years, can easily be made, it would seem unwise to rely on improved retirement benefits as a means of inducing any significant reduction in the level of unemployment.

Although the lowering of retirement age is but one of many ways in which the supply of labor may, during the 1960's, be brought into balance with the demand for labor, this policy is nevertheless the one which has actually been inaugurated. Action amending the Social Security Act to permit men to retire at age 62 was founded on the assumption, Professor Saville points out, that earlier retirement would reduce unemployment in the short run. The federal government's action, as well as the controversy among students of several disciplines as to the merits of earlier retirement, underscores the need for further study of flexible retirement—which implies individual choice in at least two dimensions: the option of working less than a normal number of hours each week, and the selection of the time a pension will begin. In his analysis of the effects of varying the retirement age, the author considers, first, the number of older persons that would be affected; second, the changes in incomes that might occur; third, the effects on income, welfare, and productivity under conditions of full employment; and finally, the short- and long-run effects on employment in periods of less than full employment.

In 1960 there were about 24 million persons aged 60 or over in the United States; about 30 per cent of these persons were in the labor force. The author estimates that a reduction of one year in the conventional retirement age might induce about 16 per cent of the men and 6 per cent of the women (or a total of 150,000 workers at the 1960 level of population) to retire in their sixty-third year. Raising the retirement age by one year would result in a somewhat smaller shift. Moving the conventional retirement age to 60 or 70 would in either case affect perhaps one-half million persons at present, and projecting these changes into the future might produce only a modestly greater impact. Although there will be about 17 million persons in the age group 60 to 69 in 1975, as compared with 13 million at present, if current participation rates continue probably no more than three-quarters of a million persons would be coming into or going out of retirement if the conventional retirement age were moved five years in either direction. In explaining why the influence of the conventional retirement age is so small, three factors are considered: variations in the general level of employment, modification in the eligibility rules for pensions, and decline in income associated with retirement.

In discussing the question of income in retirement, figures are cited indicating that both men and women receive about half as much income in retirement as they did when working full time. Even so, full-time work is much less rewarding among those 65 and over than it is among persons in the age class 55 to 64. Part of the explanation for this may lie in the reasons for continued employment, rather than in the fact of employment itself. Part also may lie in the general pattern of income-age data, which displays a peak for men in the age group 35 to 44, and for women in the next earlier age class, 25–34. From age class to age class throughout the middle range of this distribution, declines in average income from the peak are modest; at either end of the distribution, for both the young and the old, reductions in income are large.

In the future, employment and property income of the aged will probably decline in relative importance, and public programs will assume pre-eminence. In the future, therefore, the maintenance of demand for goods and services on the part of the retired group, as well as the feasibility of retirement itself, appears to rest on government-sponsored programs, notably the OASDI. In view of this major governmental role and the fact that OASDI benefits have become available to men as well as women at the age of 62, the probable economic consequences of varying the retirement age are examined, first under assumed conditions of full employment.

Given the present relative level of pension benefits and employment income, the study concludes, increasing the retirement age from its present level might influence few workers to re-enter the labor force and thus cause little change in income. In considering the income effects of lowering retirement age, the decline in total income associated with dropping the conventional retirement age by one year is roughly estimated at four hundred million dollars. Moving the retirement age back to 60 could produce a change in national income of perhaps two billion dollars, or less than 1 per cent of the total. However, this income loss would not be borne equally by the whole population, but instead by one group of older workers.

Not all of the results of changes in retirement age can be measured in terms of money income. Consideration needs also to be given to the utility derived directly from the ability to alter the number of hours worked and the nature of the job. The well-being of older persons may be improved by a better fit of the individual's desire and his capacity to work. Hence, reducing the number of hours in the workweek or moving to less strenuous employment—two facets of flexible retirement—leads to better adjustment to individual needs.

Influences on productivity resulting from flexible retirement tend to be offsetting. Some improved productivity is provided by the market mechanism as it moves the less skilled into part-time work and early retirement, and holds the higher skilled in full-time employment. Offsetting the market mechanism is the tendency of persons with higher incomes, and presumably with higher skills, to leave gainful employment at an earlier age than those with lower incomes and skill. If retirement age is reduced, fewer skilled workers have the use of more capital equipment; if it is increased, an increased number of skilled workers have the use of relatively less equipment. In either case, virtual balancing of tendencies may be imagined, with some preference being given to the prospective gains from earlier retirement.

Income loss thus seems to be the major cost of earlier retirement, on the assumption of a fully employed economy. But what of the underemployed economy? Used as a device for reducing unemployment in the short run, flexible retirement has been treated as synonomous with earlier retirement. One may suppose that the worker who is forced to retire instead of being laid off may not be replaced, or that he is replaced from the ranks of the unemployed drawing insurance benefits, or that he is replaced by a new entrant to the labor force. In the first two cases, an adverse effect on total personal income (and hence employment in the short run) may result from earlier retirement. In the third case, if the new worker receives as much as the man he replaces, there is an income gain amounting to the pension of the retired worker. The results of the use of flexible retirement as a device for reducing unemployment in the short run thus hinge on the questions of replacement and the source of replacement of retired workers.

Long-run unemployment is characterized by an accumulation of a hard core of individuals for whom unemployment benefits have expired, and the presence of a number of young new entrants unable to find jobs. In this situation two independent variables are critically important, the first being the rate at which automation proceeds. Current studies foresee a continued reduction in the manpower needed to produce a given output. The second factor results from population increase. Having passed the peak of its initial influence on demand, the population explosion may soon exercise a moderating influence on the economy, as postwar babies become part of an already expanded labor force. In sum, the first of these factors will tend to reduce the demand for labor, the second to increase the supply. Will flexible retirement be sufficient to reduce this superabundant labor force?

To the extent that retiring the older worker results in the hiring of a new entrant to the labor force, the long-run effect would be an increase in total personal income, again by the amount of the old-age benefits. Such an increase in income might have an important influence not only on aggregate demand, but on its composition as well. The relatively modest gain in income which might accrue to society from earlier retirement would come, however, at the expense of retirees, who already share less than proportionately in the total income. Increasing employment opportunities for younger individuals could be accomplished less objectionably by this device if pensions of those retiring earlier were increased.

Recent growth of both population and automation, however, dictates massive national action in providing a more general solution to the employment problem. As in the earlier study of labor force requirements and labor supply, the necessity of a broader program for dealing with unemployment is stressed. Although from the individual firm's point of view, varying the retirement age might prove a useful balancing instrument, the strength of flexible retirement lies, not in its use as a means of reducing the size of the labor force, but rather in its ability to adjust the individual's capacity to his working environment.

In the second of his essays Professor Saville raises several questions regarding the extent and results of flexible retirement abroad. Subject to the limitations imposed by the inadequacies in statistical reports, the author draws certain inferences. First, although flexible retirement policies are concentrated in Europe and America, which are highly developed economic areas, no correlation between income and flexible retirement within these areas is evident. Moreoever, population structures influence the adoption of pension programs, but not the introduction of flexible retirement. Finally, actual adoption of flexible retirement does not seem to be related to the general level of economic activity, or to the need to adjust the size of the labor force to the labor requirements of the economy. These inferences mean that the adoption of flexible retirement in many states has not improved the adjustment of the labor force to the economy's labor requirements.

Following the essays on employment and retirement, Professor Blackburn examines the impact of pension funds on such economic quantities as national income, consumption, saving, interest rates, and national wealth. Stressing the fact that additions to pension funds represent saving, a fact which has important implications for the entire economy, the author points out that at the end of 1960 public and private pension funds held assets of $105.9 billion. Deducting the funds maintained under old age, survivors, and disability insurance programs (which are virtually on a pay-as-you-go basis), the total of private and public funds operated more or less on a funded, actuarial basis amounted to $83.3 billion. Perhaps even more significant than the absolute size of funds is their rapid rate of growth in recent years: from $23.8 billion in 1950 to $83.3 billion in 1960, or a growth of 250 per cent. These funds amounted to over 4 per cent of the estimated national wealth for 1960. In that year alone, pension funds grew by $8.0 billion, a figure which represents 31 per cent of all personal saving.

Beginning with a static model, the study then proceeds to examine, in turn, the effects of changes in certain variables associated with pension funds upon the levels of national income, consumption, etc. Analysis on the basis of a model for the United States throws light on the question of the likely cause of pension-fund accumulations in the next two decades. Will these funds grow at an increasing rate, a decreasing rate, or are they likely to reach a peak, followed by a period of stability or even decumulation? Suppose, for example, that the mean benefit is growing at a rate of 2 per cent per year, the percentage of labor force coverage at 6 per cent, the funding percentage at 2 per cent, and median life expectancy at retirement at .2 years annually. Then pension funds would need to grow roughly 11 per cent per year.

Since little or no vesting of beneficiaries' rights requires a much smaller fund than is necessitated by full vesting, a trend toward liberalized vesting privileges would result in an even faster rate of growth than the hypothetical 11 per cent. If there were, at the same time, a trend toward either earlier retirement or lower interest rates, the growth rate in pension funds would be larger still.

It would appear, then, that pension fund decumulation is virtually out of the question. If one makes the plausible assumptions that mean benefits, coverage of the labor force, life expectancy at retirement, and extent of vesting privileges are likely to rise, not fall, then the only sources of tendencies toward decumulation would lie in the areas of retirement age, interest rates, the funding percentage, or the parameters of the population functions.

Although lower funds could result from a later retirement age, the existing state of the labor market suggests that such pressures as exist will favor earlier, not later, retirement. Evidence of this pressure is the recent amendment to the Social Security Act permitting optional early retirement. Nor does the author expect interest rates to rise beyond their 1959–60 level to the extent necessary to lower the required pension funds in the area of yields on investments. There appears to be no tendency to reach a peak in fund requirement from changing population parameters. A modest relative decline by 1975 in the numbers of persons aged 35–44, reflecting the 1930's birth rates, is not sufficient to reduce the total of required funds. Finally, one might suspect that the funding percentage would rise, as past service obligations of recent plans are gradually funded. Accordingly, the author concludes that pension funds will grow for a long time, in the absence of some radical reversals of present trends.

In addition to the question of pension-fund growth, the question of the impact of pension-fund operations on aggregate savings is also raised. Except for 1947 and 1949, pension saving shows a mixed though generally rising trend as a percentage of personal saving, and a steady growth in absolute terms. If, as we might suppose, pension saving tends to increase total personal saving, the figures for recent years should reflect this trend; however, personal saving as a percentage of personal income or disposable income showed very little change in the last ten years. The author suggests that potential saving as a percentage of full employment income may have increased as a result of pension saving, without any observable increase in realized saving as a percentage of realized personal income. The economy was operated at less than full employment of labor and capital for the last five years; quite possibly a pension-induced upward shift in the savings function has been at least partly responsible.

Still another question posed by the existence and rapid growth of pension funds has to do with the capital markets. In 1959 non-insured pension funds became the largest net purchasers of stocks in the United States, and in 1960 that position was retained by a widened margin. Pension funds are among the important buyers of corporate bonds, absorbing 22 per cent of 1960 net issues. Relative yields of stocks and bonds are thus strongly influenced by the decisions of pension-fund managers. To what extent has the demand situation for bonds and stocks which has produced the reverse yield pattern in recent years been due to the investment behavior of non-insured pension funds? Heretofore there were no operations of similar size by financial intermediaries, except possibly those of investment companies (which reflect indirectly the investment preferences of individuals). To what extent have recent efforts to reduce long-term interest rates, only modestly successful in the bond and mortgage markets, had their greatest effects in the stock markets? Federal Reserve and other policy measures may have abetted the effect of pension-fund operations in driving down stock yields, through a complex operation of fund shifts between sectors in the economy. Since interest rates are only a part of the whole structure of rates of return on wealth, monetary policy affects all of these rates of return.

In the final article the authors consider the economic position of older persons who are no longer full-time members of the labor force, discussed earlier by Professor Saville, and the likelihood that the ratio of workers to non-workers in the aged population will continue to diminish, as these essays and others have predicted. As the number of retirees increases, it becomes more important to consider measures whereby the aged may be assured a more equitable participation in the fruits of a technologically progressive economy. After reviewing the economic experience of the aged during the past 20–25 years, the authors describe the main threats to the comparative economic security of the aged, and then pose as a possible solution a Social Credit scheme.

Analysis of the factors which condition the absolute and relative economic position of the aged begins with a review of the changes in real output per man-hour during the past 70 years—an increase of between 2 and 2.5 per cent per year. The movement of output per man-hour, however, is an imperfect indicator of the past and the prospective performance of the American economy in that it implicitly exaggerates the role of labor and neglects both the changes in the composition of the labor force and the increase in capital per unit of labor input, which has risen by about one per cent per year. Finally, when allowance is made for the growth of both labor and capital inputs, about half the growth in aggregate output is still unaccounted for. This unexplained residuum was contributed by improvements in productivity per unit of input made possible by technical progress, better organization, etc.

The increased output derived from this technical and related progress can be distributed, first, by allowing prices to fall as costs of production are lowered. As the prices at which goods and services sell decline, the real incomes of all consumers rise because of increases in the purchasing power of their money incomes. But this mode of diffusing the fruits of technical progress has had little support, the objections being that it favored the creditor class at the expense of the active class (i.e., entrepreneurs, wage-earners, salaried workers), and that continually falling prices in a dynamic economy accentuated tendencies to unemployment.

The distribution may be accomplished, secondly, by holding the general price level comparatively constant, while allowing the money incomes of those receiving wages, salaries, profits, and rent to rise sufficiently to maintain a suitable balance between the value of output and the sum of the money incomes paid out. Under this arrangement all persons on fixed incomes would virtually be denied a share in the increase in output, and suppliers of capital would be permitted to participate only in so far as they held equities rather than claims to fixed amounts. This mode of diffusion entails an increase in bank credit and money roughly commensurate with output, the increments in the money supply being used to purchase labor and commodities and maintain full employment.

The propensity of modern banking systems to expand the money supply encourages the monetary demand for goods and services at current prices persistently to exceed their supply. Today the monetary system, more elastic than formerly, can be accommodated to changes in wages, whereas in the past wages had to be accommodated to the monetary system. Such a money system, which is stretched to fit the actual wage system, produces the "Labour Standard" described by Hicks.

An economy on such a Labor Standard experiences downward wage and price rigidity, and a strong tendency for upward movements in money prices. When the rate of increase in money wages exceeds the increase in output per man-hour that capital formation and technical progress make possible, a self-perpetuating inflationary process is set in motion, and creeping inflation, due to both excess demand and rising costs, emerges. The state's commitment to something like full employment, and hence to the occasional use of expansionist monetary and fiscal policies, is taken for granted by both unions and employers. The result is that prices are much more likely to rise than they are to remain stable or decline. In this inflation-prone economy more and more automatic price-increasing mechanisms (escalator clauses, improvement clauses, wage and employment guarantees, etc.) may be built into the system. The factors which have served to stabilize economies in the past—price and wage rigidities, the supposition that prices have normal levels above which they do not permanently rise—may be progressively dissipated. The elasticity of price expectations may then often rise until it equals or exceeds unity, and rising prices may come to be regarded as normal.

In a society based on a Labor Standard the aged are particularly vulnerable to rising monetary and real costs. They already draw less than half their cash income from labor, the exchange value of which tends to be guarded, and more than half their income from claims, the exchange value of which tends to diminish. Moreover, as time passes they will draw a declining fraction of their income from the sale of labor and an increasing fraction from other sources, most of which are especially susceptible to inflationary price movements.

Concern with the threat of inflation is heightened by the present widely held belief that creeping inflation is essential to full employment and commensurate economic growth. It is apparently supposed that the exercise of trade-union power will keep average money wages increasing so much faster than output per man-hour that intolerable amounts of unemployment will emerge unless the money supply is increased at an inflationary rate. Should policy in the future be based upon this set of suppositions, ideas, and expectations, the purchasing power of the aged's income could decline rapidly.

But even if the prices paid by the aged remained stable, the relative economic position of the aged person would worsen as he grew older. Since the aged's incomes are drawn predominantly from fixed-income instruments, they do not share in the fruits of technical progress, which are distributed largely in the form of wages, salaries, profits, and rent. Some but by no means all of the technical progress is in fact imputable to these functions. Such progress is largely the result of the application of accumulating scientific knowledge, an essentially communal product, together with improvements in the human factor and residual forces which may be assembled under the head "increasing return."

It is not possible at present to impute output to inputs specifically devoted to increasing education per head, to the store of income-increasing scientific knowledge, or to the application of this knowledge in the form of invention and innovation. Nor is it possible to estimate with high accuracy what part of the unexplained residual attributed to technical progress is traceable to public as distinguished from private investment. The arbitrary assumption is made that the advances due to public investment in education, research, invention, and innovation serve to increase income per adult at least 1.0 per cent per year. This annual 1.0 per cent of income, then, will be the rate at which the aged participate in the social product.

In selecting the base to which the rate is to be applied, one has first to set certain limits: a ceiling of $10,000 for an individual or family head might be set; account must be taken of the age at which retirement occurs; the right to participate should bear some rough proportion to his past and current contribution to national income. The rate does not apply to wages, salaries, and profits, or to interest income. In short, the most workable basis appears to be the benefits paid out under the Social Security System and the private industrial pension system with which the retiring person is affiliated. Conceivably a portion—one-half, say—of the payments under a private annuity might be included.

Under this scheme a man who retires at age 65 and begins to draw benefits totaling $4,800 per year would receive a Social Credit of 1.0 per cent in the second year of his retirement, 2.01 in the third year. In his second year he would therefore receive a supplement of $48.00; in his third year, $96.48, and so on until his sixteenth year of retirement his supplement would be roughly 16.1 per cent of $4,800, or $672.80. Should the aged person have an income larger than $4,800, his supplement would be proportionately larger, but subject to the limitation that any benefits in excess of $10,000 per year should not be eligible for the Social Credit. The Social Credit could be financed through additions to the social security tax and (perhaps half) from an increase in the personal income tax.

Such a Social Credit would reduce appreciably the progressive tendency of the real income of the representative aged person to lag behind the steadily advancing average income of the non-aged person, as long as the general price level remained stable. It would not, of course, guard the aged against the income-eroding effects of price inflation. The only hope of containing inflation lies in controlling the money supply, and in mobilizing public opinion against groups which generate inflation by seeking to raise their real incomes faster than increases in output permit. The importance of price stability and a scheme permitting the aged to share in the fruits of economic growth is underscored by earlier studies in this volume, which predict even further declines in labor-force activity of older persons.

Joseph J. Spengler

II. AGING POPULATIONS: MECHANICS, HISTORICAL EMERGENCE, IMPACT*

> *In order to show by enumeration that the perimeter of a circle is less than that of any other figure of the same area, we do not need a complete survey of all possible figures, but it suffices to prove this for a few particular figures whence we can conclude the same thing, by induction, for all the other figures.*—R. Descartes, in *Regulae ad Directionem Ingenii*

This paper has to do with the mechanisms that bring about an increase in the relative number of aged persons in a population. For reasons of expositive convenience, the relative number of persons aged either 60 and over, or 65 and over, will be conceived of as representing the relative number of "aged persons." The first section of this paper will deal with the quantitative mechanisms of the process whereby the relative number of aged persons increases. The second section is devoted to the historical emergence of aging populations; and the third, to some of the responses and circumstances which antedate, or are associated with, the emergence of an aging population. The presentation is essentially theoretical in character, though illuminated with empirical data.

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1. MECHANICS

Of the population models at hand, that of the stable population is most suited to explain the mechanics of population aging and the emergence of so-called older populations. A stable population is one whose age distribution is constant; its rate of increase may be positive, zero, or negative. Such a population will evolve if the fertility of women at each age remains constant for a sufficiently long period of time and also if age-specific mortality and the ratio of male to female births remain unchanged meanwhile. Should these conditions persist for 50–100 years, a stable population, or at least a very close approximation to a stable population, would come into being.[1] For the age composition of any population is the product of its past natality and mortality, together with the number and age of the migrants who have entered or left this population; and in the absence of such migration, it is determined entirely by past natality and mortality.

Comparison of stable-population models enables one to distinguish the incidence of mortality change upon age composition from that of fertility change, given that external migration is without influence. It will be assumed initially, therefore, that a population is closed and that its age distribution is affected only by changes in age-specific fertility or in age-specific mortality. Then, in keeping with the method of comparative statics, the stable end products of assumed changes in mortality and/or fertility may be contrasted. Later on, however, account will be taken of relevant effects both of external migration and of transitional changes associated with movement from one stable age-composition to another.

Tables 1 and 2 include data descriptive of stable populations found, respectively, in high-mortality and in low-mortality countries.[2] Since the so-called problem of aging tends to be more acute in countries with *both* low mortality and low fertility than in countries with high mortality,[3] we may turn first to Table 2 for illustrative

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[1] On the genesis of a stable population, see Ansley J. Coale, "How the Age Distribution of a Human Population Is Determined," *Cold Spring Harbor Symposia on Quantitative Biology*, 22 (1957), pp. 83–89; Alfred J. Lotka, *Théorie analytique des associations biologiques.* Deuxième partie: *Analyse démographique avec application particulière á l'espèce humaine* (Paris, 1939), pp. 64–77.

[2] The data in these tables have been taken from United Nations, *The Aging of Populations and Its Economic and Social Implications,* Population Studies, No. 26, Table 16 (New York, 1956), p. 27.

[3] It is here supposed that when mortality is high fertility also tends to be high; this is not a necessary relationship but one that is highly probable on both social and (as indicated below) actuarial grounds.

Table 1. High-Mortality Stable Population

	E = 20					E = 30					E = 40				
G.R.R.	P.	A.	B.R.	D.R.	N.I.	P.	A.	B.R.	D.R.	N.I.	P.	A.	B.R.	D.R.	N.I.
4.0	52.4	2.4	63.8	53.0	10.8	49.2	2.6	59.8	35.3	24.5	47.3	2.7	57.3	24.1	33.2
3.0	57.6	3.9	50.5	50.2	0.3	54.5	4.1	47.7	33.7	14.0	52.5	4.4	46.0	23.3	22.7
2.5	60.7	5.2	42.8	49.1	−6.3	57.6	5.5	40.6	33.2	7.4	55.6	5.9	39.3	23.2	16.1
2.0	64.0	7.1	34.2	48.6	−14.4	60.9	7.7	32.7	33.6	−0.9	58.8	8.3	31.7	23.7	8.0
1.5	66.9	10.5	24.8	49.7	−24.9	63.8	11.5	23.8	35.0	−11.2	61.6	12.5	23.1	25.6	−2.5
1.0	68.3	16.9	14.6	54.4	−39.8	65.0	18.7	14.0	39.9	−25.9	62.6	20.4	13.6	30.9	−17.3

Source: See Footnote 2.

Abbreviations: G.R.R.—Gross Reproduction Rate; E.—Expectation of life at birth; P.—Percentage of stable population aged 15–59; A.—Percentage of stable population aged 60 and over; B.R.—Births per 1,000 inhabitants; D.R.—Deaths per 1,000 inhabitants; N.I.—Excess of births over deaths per 1,000 inhabitants.

Table 2. Low-Mortality Stable Population

G.R.R.	E = 50					E = 60.4					E = 70.2				
	P.	A.	B.R.	D.R.	N.I.	P.	A.	B.R.	D.R.	N.I.	P.	A.	B.R.	D.R.	N.I.
4.0	45.8	2.7	55.7	16.2	39.5	44.4	2.7	54.1	9.4	44.7	43.3	2.6	52.7	4.1	48.6
3.0	50.9	4.5	44.9	15.8	29.1	49.6	4.4	43.8	9.6	34.2	48.4	4.3	42.9	4.8	38.1
2.5	53.9	6.1	38.4	16.0	22.4	52.6	6.0	37.7	10.1	27.6	51.4	5.9	37.0	5.5	31.5
2.0	57.2	8.6	31.1	16.8	14.3	55.8	8.6	30.6	11.1	19.5	54.7	8.5	30.1	6.8	23.3
1.5	60.0	13.0	22.7	18.8	3.9	58.7	13.1	22.5	13.5	9.0	57.7	13.0	22.3	9.4	12.9
1.0	60.7	21.5	13.4	24.3	−10.9	59.4	21.9	13.3	19.0	−5.7	58.6	21.9	13.3	15.1	−1.8

Source and Abbreviations: Same as in Table 1.

purposes. The Gross Reproduction Rate (hereafter abbreviated to G.R.R.) is there used to represent the force of fertility.[4] Similarly, expectation of life at birth (hereafter designated E)[5] is used to represent the force of mortality. In Table 2 six Gross Reproduction Rates, ranging between 4 and 1, have been combined with three life expectancies at birth, ranging between 50 and 70.2 years, to yield 18 stable age distributions. In Table 1 the same six rates have been combined with three low life expectancies to yield another 18 stable age distributions. We thus have 36 age distributions characteristic of 36 stable populations and fairly descriptive of most of the stable populations that would come into being in various parts of the world if current fertility and mortality schedules were to remain constant for 50 or more years.

Comparison of the percentages reported in Table 2 indicates that up to now the proportion of persons aged 60 and over in a stable population has been *affected only negligibly by changes in the expectation of life at birth and almost entirely by changes in fertility as measured by the G.R.R.* One finds that if the G.R.R. is held constant at 4.0, the percentage (reported in the columns headed A) formed by persons aged 60 and over approximates 2.7, whatsoever the life expectancy, while if the G.R.R. is held constant at 1.5, the percentage approximates 13.0, whatsoever the life expectancy. In general, reading horizontally and to the right along any line in Tables 1 and/or 2 reveals only minor changes (if any) in the relevant values of A as life expectancy E rises. I say relevant values because life expectancy at birth has seldom fallen below the 30's in the past 150 years, and most of the increase in A that accompanies increase in E is associated with progress in E from 20 to 40. This means that decline in mortality has little effect upon population aging, at least so long as life expectancy does not exceed 70. If, now, one reads the columns headed A vertically, one finds that the value of A increases steadily as the value of the G.R.R. descends from 4.0 to 1.0; it is 7–8 times as high when the G.R.R. is at the level of 1.0 as when the G.R.R. is at the level of 4.0. This means that decline in fertility (i.e., in the G.R.R.) exercises a very great influence upon a population's age distribution. This influence is so great, when contrasted with that exercised by increase in life expectancy at birth, that *one is warranted in attributing the post-1850 aging of populations almost exclusively to decline in fertility.*

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[4] The term "total fertility" is commonly used to describe the total number of children that would be born to a cohort of 1,000 women arriving at the age of child-bearing if none died before passing through this age. The Gross Reproduction Rate designates the total number of girls born to such a cohort divided by 1,000. Thus, if a cohort of 1,000 women will produce, at current age-specific fertility rates, 3,122 children, given that no member of the cohort dies before completing the child-bearing period, and if 1,517 of these children are girls, the Gross Reproduction Rate is 1.517. See Robert R. Kuczynski, *The Measurement of Population Growth* (London, 1936), pp. 117–130.

[5] The symbol $\overset{\circ}{e}_x$ is usually employed to represent the complete expectation of life at age x, or the average number of years lived after age x per person surviving to exact age x. E designates $\overset{\circ}{e}_x$ when x designates age 0. See L. I. Dublin, A. J. Lotka, and M. Speigelman, *Length of Life* (New York, 1949), pp. 20–22.

What has been said respecting the impact of mortality declines and increase in life expectancy upon the relative number of persons aged 60 and over may be subject to minor qualification. For the effect of mortality declines upon age composition depends upon the distribution of these declines among the members of a population. Mortality declines will not alter a population's age composition if survival rates at all ages increase in the same proportion. If, however, mortality declines are confined to members of a population aged (say) 50 and over, they have no effect upon the number of births and the long-time growth rate, serving only to increase the absolute and the relative number of persons who survive to older ages. If, on the contrary, mortality declines are confined to children (say) under 5, they will affect age distribution much as does an increase in fertility; they will presently (i.e., about 13–17 years hence) begin to increase the number of parents and the flow of births as well as the rate of population growth. In the past century mortality declines have usually decreased the median age of the population somewhat and have decreased the proportion of the population aged 65 and over in about half of the 44 cases studied. For the age-reducing effect of mortality declines among those aged under 5 has more than offset the age-increasing effect of mortality declines among those over 50, while the probability of survival has increased much less and in similar proportions among those aged 5–50. Whence Coale concludes that "most mortality improvements in the past have produced a younger population than would have resulted from unchanged mortality, other factors the same." [6]

While improvements in mortality may continue to produce younger populations in countries in which mortality still remains high, they will tend to produce older populations in countries in which mortality risks have by now fallen to low levels. For with a life expectancy at birth in the 70's, 96–98 per cent or more of all live-born females survive to childbearing age (i.e., to 15) and 93–97 per cent reach an age (i.e., 40) beyond which very few children are borne; there is little scope, consequently, for mortality reduction to increase the fraction surviving to and through the childbearing period.[7] The mortality declines in prospect, therefore, will probably prolong the life of those who reach 50 more than enough to offset the effects of any further decline in mortality among those under 5. Such at least will be the probable effect of further declines in mortality in Western countries with life expectancies in the neighborhood of 70.[8]

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[6] See Coale, *op. cit.*, and "The Effects of Changes in Mortality and Fertility on Age Composition," *Milbank Memorial Fund Quarterly*, 34 (1956), pp. 79–114; George J. Stolnitz, "Mortality Declines and Age Distribution," *ibid.*, pp. 178–215; also A. J. Coale, "The Effects of Declines in Mortality on Age Distribution," in F. G. Boudreau and C. V. Kiser, eds., *Trends and Differentials in Mortality*, Proceedings of the 1955 Annual Conference of the Milbank Memorial Fund (1956), pp. 125–133. See also A. Sauvy, "Le Vieillissement des populations et allongement de la vie," *Population*, 9 (1954), pp. 675–682; F. Lorimer, "Dynamics of Age Structure in a Population with Initially High Fertility and Mortality," *Population Bulletin of the United Nations*, No. 1 (1951), pp. 31–41 and unsigned, "The Cause of the Aging of Populations: Declining Mortality or Declining Fertility?", *ibid.*, No. 4 (1954), pp. 30–38.

It is when mortality declines appreciably below levels corresponding to a life expectancy of 70 that such decline accelerates population aging. If we replace a population with a G.R.R. of 4.0 and an E of 20 by one with a G.R.R. of 1.0 and an E of 70, the decline in mortality increases the proportion aged 60 and over only from 2.4 to 2.6 per cent of the population. If now we hold the G.R.R. at 1.0 per cent and increase life expectancy (i.e., E) further to 90, the proportion aged 60 and over rises from 22 per cent to about 33 per cent. Even if the G.R.R. is at approximately the 1.5 level, increase in E from 70 to 90 produces a correspondingly high increase in the relative number of persons aged 60 and over, from about 13 to close to 20 per cent of the population.[9] With E at 70 it is not possible to increase the rate of population growth much by decreasing mortality; in fact, if death were abolished altogether the growth rate would rise by less than 2 per 1,000. The proportion aged 60 and over would increase markedly, however, if immortality replaced a life expectancy of 70 at birth; with the G.R.R. at 1.5 or lower it would approach 41.4 per cent or exceed this figure, though with a G.R.R. as high as 3.0 it would not rise above 9.1 per cent. It is much more likely, of course, that the G.R.R. will lie between 1.0 and 1.5 than that it will approximate 3.0.[10]

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[7] Ninety-two to ninety-six per cent attain the age of 45. The above percentages are based upon the model life tables prepared by the United Nations. See United Nations, *Methods for Population Projections by Sex and Age,* Population Studies, No. 25 (1956), and *Age and Sex Patterns of Mortality,* Population Studies, No. 22 (1955). See also K. R. Gabriel and Ilana Ronen, "Estimates of Mortality and Mortality Rates," *Population Studies,* 12 (1958), pp. 164–169.

[8] Stolnitz, *op. cit.,* Tables 1, 3, 8, and 10.

[9] United Nations, *The Aging of Populations,* pp. 28–30.

[10] See Ansley J. Coale, "Increase in Expectation of Life and Population Growth," *Proceedings of the International Population Conference,* held in Vienna under the

Fertility-reducing forces make for population aging because they reduce the rate of population growth and the rate at which births flow into the lower age groups. In consequence younger cohorts no longer exceed older cohorts so markedly, if at all, in size, with the result that the median age of the population rises, the age distribution itself becomes less favorable to fertility, and the relative number of persons aged 60 and over increases. A rise in fertility produces an opposite set of effects.

The trends illustrated by the data presented in Tables 1 and 2 hold generally even when a population is in transit from a stable form characterized by relatively high fertility and/or mortality to one characterized by relatively low rates. They are manifest also in the unfolding of populations that have been projected into the future on the basis of an initial set of suppositions respecting fertility and mortality. While a certain amount of oscillation may mark the upward or the downward movement of the relative number aged 60 and over when the G.R.R. or life expectancy is changed and one stable population is gradually transformed into another, it is the upward or downward movement that is paramount.[11]

> Transitory effects on age distribution are in the same general direction as the eventual effects on the stable age distribution. A rise in fertility produces an increase in the proportion in the younger age groups at the expense of the older; a proportionate increase at all ages in the probability of surviving affects only the growth rate; an extra increase in survivorship at the youngest ages has an effect much like a rise in fertility; an increase in survivorship at the older ages tends to raise the fraction at these ages.[12]

While age compositions tend to be more irregular and notchy and knobby in the world of reality than in that of hypothetical stable populations, inferences drawn from comparisons of the latter continue to hold. In the world of reality both mortality and fertility may vary appreciably from year to year, sometimes rising above and sometimes falling below trend levels and then moving back to these levels. This is true of mortality in that while every person born must die, he may die at any time within the interval separating his birth and the end of his life span (say 110 ± 10 years),[13] with the result that cata-

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auspices of the International Union for the Scientific Study of Population in 1959 (1959), pp. 36–41.

[11] United Nations, *The Aging of Populations*, pp. 30–43.

[12] Coale, "The Effects of Changes in Mortality and Fertility on Age Composition," *loc. cit.*, p. 113.

[13] See J. T. Freeman's essay, "The Geriatric Limb on the Gerontology Tree," in N. W. Shock, ed., *Aging: Some Social and Biological Aspects* (Washington, 1960), p. 20.

strophic events (e.g., war, epidemic desease) may greatly increase mortality for short periods.[14] Natality may vary even more than mortality, for a fecund woman may not only choose to bear a given number of children earlier or later within her effective child-bearing period (say between the ages of 15 and 40), but may also determine to make this number larger or smaller within certain limits (say 0 to 10). The birth rate and the annual number of births may vary appreciably, therefore, between times of war and times of peace, between times of prosperity and times of depression, and so on.[15] As a result of such variations in the annual number of births, or birth cohorts, humps and hollows are introduced into a population's age distribution and not only move through it as these abnormally sized cohorts age but also produce positive or negative echo effects when the children of these oversized or undersized cohorts attain child-bearing age.[16] In consequence, the rate at which the labor force increases may vary. These transitory waves of high or low fertility may be of some significance, therefore, in respect of the maintenance of full employment; but they exercise little influence upon the course of a population's aging.[17]

It is very difficult to describe in simple terms the impact of net migration upon a population's age distribution, particularly since migration fluctuates so much in volume and varies greatly in time. One may, of course, say that the ratio of net migration to a country's population is seldom large enough to affect its age distribution significantly and that even this effect tends in time to be swamped by the cumulative influence of domestic natality and mortality. Net immigration will decelerate a population's aging if it increases the younger age groups by a larger fraction than it swells the older age groups, and particularly if the young immigrants are able to increase the flow of births notably. If, on the contrary, net immigration contributes primarily to the increase of those in and above the upper 30's, it will presently accelerate the aging process since the immigrants themselves will move into the older age groups before they have increased the flow of births significantly. The influx of migrants into the United States as well as into many European, Latin American, and Asian countries is now too small to affect the aging process notably. Studies relating to the present century reveal migration to have had little effect upon population aging. The effect of migration has been relatively small even in the United States, where foreign-born persons formed only 13.2–14.7 per cent of the population in 1860–1920, 11.6 in 1930, 8.8 in 1940, and 6.9 in 1950, and where the percentage of the foreign-born aged 65 and over rose from 7.5 in 1890 and 9.3 in 1900 to 12.4 in 1930 and 26.7 in 1950. For example, between 1900 and 1950 the relative number aged 65 and over rose from 4.1 to 8.1 per cent to 6.8 per cent in the *total* population, thus moving along an incline not much above that traversed by the native population, from 3.2 to 6.8 per cent.[18]

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[14] E.g., see Henri Bunle, *Le Mouvement naturel de la population dans le monde de 1906 á 1936,* Les éditions de l'Institut national d'études démographiques (1954), pp. 322–389. Annual mortality among German males was about 70 per cent higher in 1915–18 than in 1913, largely because of the toll of war. Mortality among German females was about 30 per cent higher in 1918 than in 1914 or 1915, largely because of the influenza epidemic of 1918. *Ibid.,* p. 333.

[15] E.g., see *ibid.,* pp. 289–305; Robert R. Kuczynski, *The Balance of Births and Deaths* (New York, 1928), pp. 94–97; United Nations, *Recent Trends in Fertility in Industrialized Countries,* Population Studies, No. 27 (1958), chap. 2. See also Clyde V. Kiser, "Changes in Fertility by Socio-Economic Status during 1940–1950," *Milbank Memorial Fund Quarterly,* 33 (1955), pp. 393–429; N. B. Ryder, "Problems of Trend Determination during a Transition in Fertility," *ibid.,* 34 (1956), pp. 5–21; George J. Stolnitz, "Population Composition and Fertility Trends," *American Sociological Review,* 21 (1956), pp. 738–743.

[16] Coale, "How the Age Distribution of a Human Population Is Determined," *loc. cit.,* pp. 87–89.

[17] Variation in the rate of increase in the labor force arising from variation in annual fertility could give rise to a kind of cobweb effect if the rate of unemployment were positively correlated with the rate of increase in the labor force. Suppose fertility is low at time $t = 0$ because unemployment is relatively high. Then at (say) $t = 20$ the rate of increase in the labor force will be relatively low as consequently will unemployment. Whence fertility rises above normal in year $t = 20$ only to make for supranormal unemployment in year (say) $t = 40$. In reality, of course, the unemployment-affecting influence of variations in fertility is likely to be swamped by other forces connected little or not at all with the behavior of annual fertility rates.

In this section we have established four conclusions. (1) The aging of populations as evidenced in increase in the relative number aged 60–65 and over has been produced almost entirely by the decline in fertility and natural increase. (2) Increase in the average duration of life and even prolongation of life among those over 50 has exercised little influence upon the course of aging, sometimes accelerating it and sometimes decelerating it. (3) Net migration influenced age composition significantly only in countries (e.g., the

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[18] For a model tracing the impact of continuous net migration upon the age distribution of the populations of Argentina and Venezuela see United Nations, *The Populations of South America 1950–1980*, Population Studies, No. 21 (1955), pp. 109–139. The age structure is not much affected by this migration. *Ibid.*, pp. 118–123. For an estimate of the possible impact of immigration upon France's population at the close of the war, see A. Sauvy, "Besoins et possibilités de l'immigration française," *Population*, 5 (1950), pp. 209–228, 417–434. See also United Nations, *The Aging of Populations*, pp. 22, 47–49, and *idem*, "Some Quantitative Aspects of the Aging of Populations," *Population Bulletin of the United Nations*, No. 1 (1951), pp. 42–57. On the impact of immigration upon the age structure of the American population, see H. D. Sheldon, *The Older Population of the United States* (New York, 1958), chap. 2 and pp. 138–146; E. P. Hutchinson, *Immigrants and their Children 1850–1950* (New York, 1956), pp. 14–18.

United States) which for a time experienced heavy migration, and this influence diminished with the decline of immigration in relative importance, eventually to be swamped by the cumulative impact of fertility and mortality. (4) Should life expectancy at birth rise into and above the upper 70's, its extension would begin to affect the course of population aging significantly if the G.R.R. remained relatively low (say between 1.0 and 1.5).

2. HISTORICAL EMERGENCE

Population aging set in only in the nineteenth century, and then only in a few countries. Prior to that century life expectancy at birth was in or below the 30's, and by the close of that century it had risen, in progressive countries, only into the upper 40's or the low 50's, with the main declines in mortality not getting effectively under way until the closing decades of the nineteenth century or the early decades of the twentieth century.[19] In consequence, as was noted earlier, the decline in mortality long tended to retard rather than to accelerate population aging; in any event, it did not intensify the process. Not until recently did this process begin to be reversed, and even now there remain many countries in which further reduction of mortality would not accelerate the population-aging process.[20] As has been remarked earlier, therefore, the historical emergence of population aging has been associated almost entirely with the decline in fertility, and this decline did not, as a rule, get under way until in the second half of the nineteenth century.

While gross reproduction rates considerably in excess of 3 have been recorded (e.g., 3.65 in the Ukraine in 1896–97; 3.4 in northern Japan in the 1920's; close to 4.0 in the United States about 1800) for large population aggregates, rates in the neighborhood of 2.5–3.0 seem to have predominated in and before the eighteenth century.[21] Moreover, although natality began to fall in France and the United

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[19] See Dublin, Lotka, and Speigelman, *op. cit.*, chaps. 2–3 and Tables pp. 81–91; George J. Stolnitz, "A Century of International Mortality Trends," *Population Studies*, 9 (1955), pp. 24–55 and *ibid.* (1956), pp. 17–42; United Nations, *Demographic Yearbook* (1957), pp. 4–5.

[20] United Nations, *Demographic Yearbook*, pp. 1–5.

[21] See J. R. Russell, *Late Ancient and Medieval Population*, n.s., in *Transactions of the American Philosophical Society*, Part 2 (1958); Roger Mols, S. J., *Introduction a la demographie historique des villes d'Europe du XIV^e au XVIII^e siècle* (Gembloux, France, 1954–56); J. D. Durand, "The Population Statistics of China A.D. 2–1953," *Population Studies*, 13 (1960), pp. 209–256 and "Mortality Estimates from Roman Tombstone Inscriptions," *American Journal of Sociology*, 65 (1960), pp. 365–373.

States in the first quarter of the nineteenth century, to be followed later by a decline in natural increase, declines in natality and subsequently in natural increase did not really get under way in Europe until the closing third of the nineteenth century and even then they were confined largely to Western Europe.[22] In the present century, however, the decline in natality spread to all the countries in Europe. There as well as in Northern America and in Oceania natality fell with increasing rapidity and so did crude and true natural increase. Elsewhere, with the increasing exception of Japan and with the partial exception of portions of temperate Latin America, natality generally remained more or less at nineteenth-century levels. It remained so even though, with progress in the development of effective public-health and disease-control programs and the consequent reduction of the positive correlation of life expectancy with income, mortality fell sharply in most countries, among them many with underdeveloped economies and very low incomes. In and after the 1940's there was an upsurge of natality, especially in low-natality countries, but it has since fallen, though only in a few instances to or below the usually low levels of the 1930's.[23]

While population aging emerged in the late nineteenth century, it proceeded very slowly. About 1850 in European countries the proportion of the population aged 65 and over was about or below 5 per cent; only in slowly growing France did it approach 6½ per cent. By 1900 this proportion ranged between 5 and 8.4 per cent in European countries in which natality had fallen, and generally about or below 4 elsewhere in the world. By 1950, however, this proportion had moved upwards and into a range of 7–12 per cent in Europe, Northern America, and Oceania. It was still about 5 per cent in Japan though rising; but elsewhere in the world it remained about or below 4, as a rule.[24] The world may thus be described as divisible roughly into two sectors, one in which fertility remains high and the relative number of older persons is quite low, and the other in which fertility is relatively low and the relative number of older persons is large and rising. In 1950 in Africa, Asia, and Latin America, for example, only 4–6 per cent of the population were 60 and over. In Europe, Northern America, and Oceania the corresponding fraction was 11–12 per cent, and in the USSR it was 8 per cent and rising.[25]

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[22] See Kuczynski, *The Balance*, chaps. 1–3; Bunle, *op. cit.*, Table I; W. S. and E. S. Woytinsky, *World Population and Production* (New York, 1953), chap. 5; M. Huber, H. Bunle, and F. Boverat *La Population de la France* (Paris, n.d.), pp. 78–85; W. S. Thompson and P. K. Whelpton, *Population Trends in the United States* (New York, 1933), chaps. 7–8.

[23] E.g., see United Nations, *Demographic Yearbook* (1959), pp. 1–17 and Table 9. It should perhaps be noted that the severing of the connection between improvement in economic conditions and the reduction of morbidity and mortality is by no means complete, being attributable in marked degree to the export of death—and disease—control from high-income to low-income countries. It remains to be seen how completely this severing can be sustained in the face of high natality, low income, and persisting poverty. Even in advanced countries mortality and morbidity are somewhat associated with the environmental conditions surrounding individuals, among them income levels (which, within limits, are inversely related to mortality). On this last point, see unsigned, "Recent and Future Mortality Trends," *Statistical Bulletin of the Metropolitan Life Insurance Company,* 41 (June, 1960), pp. 1–3.

The world picture still remains much as it was in 1950, manifesting little tendency toward homogeneity in respect of population aging. Moreover, substantial change therein is not likely for some decades, given current fertility trends. For the tendency on the part of fertility to fall remains weak in Asia (exclusive of Japan), in most of Africa, and in much of Latin America; and gross reproduction in the rest of the world seems unlikely to rise appreciably. It has been estimated, therefore, that as of 1975 only 5–6 per cent of the population of Africa, Asia, and Latin America will be 60 and over. In Europe, Northern America, and Oceania, by contrast, the corresponding percentages will be 17, 16, and 14, respectively. It will approximate 11 in the USSR and 11.6 in Japan.[26] Turning to the United States we find the proportion aged 65 and over, which rose from 3.4 in 1880 to 5.4 in 1930 and 8.1 in 1950, will advance to between 9 and 10 per cent by 1980 if the G.R.R. remains within the range 1.8–2.0. It could approximate 10.5 if, as seems unlikely, the G.R.R. moved into the neighborhood of 1.3. Should life expectancy increase more than these projections presuppose, the fraction would then be slightly higher at given fertility levels.[27] If the population of the United States continues to grow 1.5–1.6 per cent per year and hence numbers about 350 millions by the year 2000, the roughly 35 million persons 65 and over in prospect 40 years from now will form about 10 per cent of the population.

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[24] United Nations, *The Aging of Populations,* p. 12; Vasilios G. Valaoras, "A Reconstruction of the Demographic History of Modern Greece," *Milbank Memorial Fund Quarterly,* 38 (1960), pp. 116–139.

[25] United Nations, *The Future Growth of World Population,* Population Studies, No. 28 (1958), Table 15. According to the 1959 census of the USSR, about 9.4 per cent of the population was 60 and over. Computed from United Nations, *Demographic Yearbook 1959* (New York, 1960), p. 165.

[26] United Nations, *Demographic Yearbook,* Table 16; also United Nations, *The Population of Asia and the Far East, 1950–1980,* Population Studies, No. 31 (N. Y., 1959), and *The Population of South-East Asia,* Population Studies, No. 30 (N. Y., 1958).

[27] These percentages are derived from Bureau of the Census, "Illustrative Projections of the Population of the United States by Age and Sex," Series P-25, *Current Population Reports,* No. 187 (1958).

One can write somewhat (though not much) more firmly about prospective mortality than about prospective fertility, since fertility tends to be more volatile than mortality. What happens in respect of life expectancy at birth can become significant if it rises from below or in the neighborhood of 70 to in the neighborhood of 90; for, as has been noted, such movement would greatly increase population aging should gross reproduction remain at levels now usually encountered in low-mortality, high-income countries. Realization of such upward movement, however, presupposes the establishment of control over a different set of causes of death from those that have been curbed in the past. For more than a century, particularly during the past 50–60 years, mortality has been reduced in considerable measure through the successive establishment of control over important epidemic and louse-borne diseases, over gastro-intestinal diseases, over tuberculosis, pneumonia-influenza, and other respiratory diseases, over the communicable diseases of childhood, and over mortality flowing from the cumulative impact of conditions associated with hard, poverty-ridden environments.[28] Today, largely as a result of this mortality reduction, cardiovascular-renal diseases and malignant neoplasms (the incidence of both of which increases with age), together with degenerative diseases, account for considerably more than half of the deaths occurring in advanced countries.[29] The future course of life expectancy, therefore, depends largely upon what can be done in respect of the control of these diseases.

Undoubtedly, man's ability to establish control over these now very important diseases will fall far short of his ability to curb the diseases he has brought under control in the past 100–150 years. It is true, of course, as data for the United States suggest, that elimination of all neoplasms as a cause of death would increase life expectancy at birth 2.0 and 2.6 years, respectively, for white males and white females; the corresponding gains at age 60 would be 1.3 and 1.5 years. It is also true that elimination of cardiovascular-renal diseases as a cause of death would increase life expectancy at birth 10.7 years for white males and 10.3 for white females; the corresponding gains at age 60 would be 9.9 and 10 years, respectively.[30] Were it possible to reduce only by half the mortality attributable to cardiovascular-renal diseases and malignant neoplasms, life expectancy at age 60 (15.7 years for white males and 19.2 for white females in 1958) would rise about five years for each sex.[31] At present, however, it can only be said that, because the more easily attainable advances have largely been won, progress in the extension of life expectancy at birth is slowing down notably and that, unless cardiovascular-renal diseases and neoplasms can be brought under control more rapidly than in the past, progress in the extension of life expectancy at advanced ages will slow down as well. It is quite possible, moreover, that increase in disease-generating forces (e.g., chemical, atomic, and other pollution of the environment; increasing exposure to urban hazards and stress; excessive avoidance of danger, discomfort, and tension; overconsumption of food, etc.) will worsen man's relevant environment and partly offset progress in methods suited to control degenerative and other diseases of old age.[32] It is to be doubted, therefore, that man's life span will be increased, or that his life expectancy at birth will be raised above 80; and accomplishing this should take 50–100 or more years.

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[28] See O. W. Anderson and George Rosen, *An Examination of the Concept of Preventive Medicine,* Health Information Research Series, No. 12 (1960); Odin W. Anderson and Monroe Lerner, *Measuring Health Levels in the United States, 1900–1958, ibid.,* No. 11 (1960). Between 1911 and 1960 death rates from selected causes per 100,000 policyholders of the Metropolitan Life Insurance Company declined from 1253 to 671.2. Of this 582 point drop 488 points are the result of decline in mortality from four sets of disease (tuberculosis, communicable diseases of childhood, nephritis and nephrosis, and pneumonia and influenza) which by 1960 accounted for only about 5 per cent of the deaths instead of for 42 per cent as in 1911. Another 62 points were accounted for by declines in mortality from appendicitis, gastritis, etc., hernia and intestinal obstruction, and complications of pregnancy and childbirth. See unsigned, "Fifty Years of Health Progress," *Statistical Bulletin of the Metropolitan Life Insurance Company,* 42 (Jan., 1961), p. 4.

[29] Of each 671 deaths among the industrial policyholders of the Metropolitan Life Insurance Company in 1960, mortality among whom now resembles that in the nation at large, 142 were attributed to malignant neoplasms, 357 to cardiovascular-renal diseases, and 32 to accidents. "Fifty Years of Health Progress," p. 4. Of each 100 deaths reported in the United States in 1959, 68.1 per cent were attributed to diseases of the heart, malignant neoplasms, vascular lesions affecting the central nervous system, and general arteriosclerosis. Unsigned, "Trends in U. S. Mortality," *Progress in Health Services,* issued by Health Information Foundation, No. 10 (1961), pp. 1 ff. These proportions indicate the orders of magnitude characteristic of economically advanced, low-mortality countries, even though intercountry differences obtain.

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[30] Unsigned, "Increased Life Expectancy in the United States," *Progress in Health Services,* issued by Health Information Foundation, No. 9 (1960), pp. 1 ff. These figures, based on American life expectancy of 1949–51, are treated more fully in B. Woodhall and S. Jablon, "Prospects for Further Increases in Average Longevity," *Geriatrics,* 12 (1957), pp. 586–591.

[31] Unsigned, "Outlook for Gains in Longevity after Age 60," *Statistical Bulletin of the Metropolitan Life Insurance Company,* 41 (Nov., 1960), pp. 1–3, and unsigned, "Trends in Survival at the Older Ages," *ibid.,* 41 (Sept., 1960), pp. 1–3. Given a life expectancy of about 70 years at birth, about 81–84 per cent of those born reach the age of 60.

[32] Up to now, of course, these forces have not been affective on balance. As was noted earlier, for example, mortality is lower among those engaged in better-paying than in poorer-paying occupations. See unsigned, "Recent and Future Mortality Trends," *Statistical Bulletin of the Metropolitan Life Insurance Company,* 41 (June, 1960), pp. 1–3. Life expectancy at birth among this company's industrial policyholders increased about five years per decade between 1911–12 and 1950, but only 2.3 years in 1950–60 and only 0.6 years in 1955–60. Unsigned, "Fifty Years of Health Progress," *ibid.,* 42 (Jan., 1961), pp. 1–7. Expectation of life increased .5–.6 a year per decade among white males in the 60's in 1929–54; among white females the rate was slightly more than twice as high as among the white males. Unsigned, "Trends in Survival at the Older Ages," pp. 1–3.

From what has been said in this section we may now draw certain inferences. It is doubtful that, with life expectancy about 70, the G.R.R. will remain as high as 1.5, since this would entail a rate of population growth of about 1.3 per cent per year (see last column in Table 2). We may suppose, therefore, that in highly developed, low-mortality countries the G.R.R. will tend to move below rather than above 1.5. This entails that the relative number of persons aged 60 and over will exceed 13 per cent and may approach close to 20 per cent. If under these fertility conditions life expectancy at birth were to advance toward 80 years, the fraction aged 60 and over would move above the 13–20 per cent levels. In fact, with life expectancy at 80 and given prospective fertility, this fraction would probably move into the neighborhood of 20.[33] It is to be expected that gross reproduction in high-fertility countries (wherein live about two-thirds of the world's population) will fall. Should natality fall 0.5–1.0 point per year from current levels of about 40–45,[34] natality in most high-fertility countries might be in or below the neighborhood of 20 by the year 2000. As a result the fraction 60 and over will have moved or be moving into the neighborhood of 13 per cent. As yet, however, there has been little manifestation of the imminence of so high a rate of decline.

3. IMPACT

My concern in this section is with the implications of the set of changes in the age composition of populations of which population aging is only one. It is misleading to study the impact of population aging as if it were a population change taking place in isolation from other population changes. Population aging is inseparably connected with other changes in age composition. All of these must be taken into account if the true impact of population aging upon production, income, and dependency is to be ascertained; for sequels to some population changes counterbalance sequels to others.

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[33] United Nations, *The Aging of Populations*, pp. 28–29.

[34] In Central Europe during the period of most rapid decline (1880's to 1920's), natality fell roughly between 0.5 and 0.75 points per year; in Japan and Puerto Rico, about one point per year during the recent period of rapid decline.

It has been shown (see Tables 1 and 2) that, with fertility constant, increase in the expectation of life at birth up to the age of 70 usually modifies the fraction of the population 60 and over very little, and then only when life expectancy is in or below the 40's. It has also been shown that population aging is attributable almost entirely to decrease in the G.R.R. (see A-columns in Tables 1 and 2). Attention may now be called to the fact that a decline in the G.R.R. eventuates in a decline in the relative number of persons under 15 and hence in an associated increase in the relative number aged 15–59 (see P-columns in Tables 1 and 2). For example, with a life expectancy of 60 at birth, the percentage of a stable population aged 15–59 rises from 44.4 when the G.R.R. is 4.0 through 52.6 when it is at 2.5 to about 59 when it lies between 1.5 and 1.0. This increase in the relative number aged 15–59 is entirely the product of decline in the G.R.R., since increase in life expectancy serves, under *ceteris paribus* conditions, to reduce the relative number aged 15–59 and increase both that aged 0–14 and (within narrow limits) that aged 60 and over. It should be noted, however, that when life expectancy at birth has reached a level of about 50—that is, a level of the sort found in the developed world today—further augmentation of the average duration of life does not greatly reduce the relative number aged 15–59 until it has moved into or beyond the upper 70's. For, with the G.R.R. given, at any level between 4.0 and 1.0, increasing life expectancy from 50 to 70.2 years reduces the fraction aged 15–59 only 3–4 per cent (see Tables 1 and 2).

Decline in gross reproduction, the cause of population aging, is thus responsible for both the increase that has taken place in the relative number of adults of productive age (say 15–59) and the decrease in the relative number of persons of dependent age (say those aged 0–14 plus those aged 60 and over). For illustrative purposes let us begin with a stable population with a G.R.R. of 3 and a life expectancy of 30, that is, with a population of the sort found in pre-1800 Europe or in parts of present-day Tropical Africa. If now the G.R.R. declines from 3.0 to 1.0 while life expectancy remains unchanged at 30 (or, for that matter, at 40, 50, 60, or 70), the percentage aged 15–59 rises from 54.5 to 65, that is, by 10.5 points or 19 per cent (see Tables 1 and 2). If next life expectancy rises to 70, these 10.5 points are reduced to 4.1, since with a G.R.R. of 1.0 and a life expectancy of 70.2, only 58.6 instead of 65 per cent of a stable population are aged 15–59 years. In general, as life expectancy rises, the percentages aged

0–14 and 60 and over rise, though with most of the rise associated with increase in life expectancy between 20 or 30 and 50 years rather than with that between 50 and 70. Decline in fertility thus permits populations to absorb increases in life expectancy without suffering *net* changes in age-composition that are unfavorable to potential productivity.

Should life expectancy increase into and beyond the upper 70's, however, it would finally become impossible, in low-fertility countries, to offset this increase by further reducing fertility. For, given a G.R.R. below 1.5, increase in life expectancy into and beyond the upper 70's would reduce the fraction of a stable population in the age group 15–59 below the 58 per cent level associated with a life expectancy of 70 and a G.R.R. of between 1.0 and 1.5. This fraction would decline to about the 52 per cent level if life expectancy at birth rose to 90 while the G.R.R. remained at 1.5. It is unlikely, however, for reasons advanced in Section 2, that life expectancy will rise above 80. If this argument proves empirically valid, therefore, the fraction aged 15–59 will decline no more than several points below the 58 per cent level, even though the G.R.R. is somewhat below 1.5.[35]

Given the changes in fertility and mortality in prospect, changes in the age composition of populations will not reduce potential productivity per capita and in many instances will increase it as in the past. The movement of the fraction of the population aged 15–59 (or 15–64) may be used to indicate the movement of potential productivity per capita as a population's age composition changes under *ceteris paribus* conditions (i.e., with capital per worker, state of the arts, level of employment, etc. given). It will be indicated below that the movement of this index (i.e., the fraction aged 15–59) is sufficient for the purposes of the present inquiry. Changes in the percentages aged 15–59 and presented in Tables 1 and 2 suggest that potential per capita productivity has changed very little (perhaps 1–3 per cent) in the past 160 years. For in a stable population of the sort associated with West European mortality and fertility as of about 1800 (i.e., with a life expectancy of 30 and a G.R.R. of 2.5) 57.6 per cent are aged 15–59; while in one associated with a life expectancy (i.e., around 50) and a G.R.R. (i.e., around 2.0) of the sort prevailing in economically developed countries about 1900, about 57 per cent are aged 15–59. Even in a stable population of the sort compatible with fertility (i.e., a G.R.R. of 1.0–1.5) and mortality (i.e., a life expectancy of 70) in present-day advanced countries, only 58 per cent are in the age group 15–59.

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[35] This argument is based on data in United Nations, *The Aging of Populations*, pp. 28–30.

Intertemporal and intercountry comparisons indicate, however, that actual changes in age composition have been greater than are suggested by these comparisons of the stable-populations. In a number of representative Western European countries, for example, 60–62 per cent of the population fell in the age group 15–64 about 1850 and again about 1900. By 1950, however, the percentage had risen to 65–67, both in these countries and in a number of countries in which as of 1890–1900 the corresponding percentage was 58–59.[36] It may be inferred, therefore, that because of improvements in age composition potential per capita productivity in these countries increased about 8 per cent between the second half of the nineteenth century and 1950. About 1950 in many high-fertility, underdeveloped countries the percentage of the population aged 15–64 fell in the range 53–56; this percentage, when compared with that of 65–67 found in many low-fertility, developed countries, indicates that, because of differences in age composition, potential per capita productivity under *ceteris paribus* conditions was about one-sixth lower in the underdeveloped than in the developed countries. Moreover, because the relative number of children of school age was so much higher in these high-fertility countries, about twice as large a fraction of the labor force was required in these countries as in low-fertility countries to supply a given level of educational services.[37]

Potential productivity per capita varies with a population's age composition for three main reasons, two of which are essentially socio-economic in character and only one of which is closely associated with the influence that age as such exercises upon a worker's psycho-physical capacities, work-experience, etc. These three age-conditioned determinants are variation in rate of participation in the labor force, variation in the fulness with which members of the labor force are employed, and variation in output per man-hour worked. Each determinant tends to vary with the age of workers, the first two largely because of the manner in which an economy is organized and the last principally because of the effects which aging has upon a worker's capacities. The response of each of these determinants to changes in age is conditioned also by a population's educational and occupational composition. It is to be presumed, however, that, when all these various determinants and conditions are taken into account, actual as well as potential productivity per capita will still be found to vary much as does the fraction of the population of productive age (say, 15–59 or 15–64).

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[36] In France, the first country to experience great changes in age composition, the percentage of the population in the age group 15–64 was 66.23 in 1850, 65.88 in 1910, and 66.53 in 1950.

[37] This and the preceding paragraph are based on data presented in United Nations, *The Aging of Populations*, pp. 7–15. For data relating to Japan, see Irene Taeuber, *The Population of Japan* (Princeton, 1958).

While variation in age affects the rate of participation in the labor force among both males and females, male activity rates may be employed to illustrate the role of age which is very much affected by socio-economic conditions and organization. Male activity rates tend to be higher at most ages, and especially at low and high ages, in countries that are underdeveloped and predominantly agricultural than in those which are not. Even so, because of differences in age composition, the fraction which male workers form of all males is slightly higher (about 5 per cent) in developed than in underdeveloped countries or than in semideveloped countries were activity rates tend to be lower among young and old males than in underdeveloped countries. If we assume stable-population conditions and male activity rates of the sort characteristic of developed, semideveloped, and underdeveloped countries, we find that, whereas increasing life expectancy from 50 to 70 years reduces by only 3–5 per cent the percentage which active males form of all males 10 years or more old, decreasing the G.R.R. from 3.0 to 1.0 will increase this percentage about two-fifths. We find also that whereas increase in the life expectancy at birth from 50 to 70 years has little effect upon the age composition of the *active* male population 10 years or more old, decrease in the G.R.R. reduces the relative number of active males aged 10–19 and 20–44 years and increases that aged 45–64 and that 65 and over.[38] How labor-force participation rates respond to changes in age composition is affected, as has been noted, by a population's educational composition, education serving to increase and to prolong participation in the labor force and in occupational activities which can be carried on effectively at higher ages.[39]

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[38] See United Nations, *The Aging of Populations*, pp. 51–56, and "Age Structure and Labour Supply," *Proceedings of the World Population Conference*, 3 (New York, 1955), pp. 571–596; also United Nations, "Factors Affecting the Size of the Economically Active Population," *ibid.*, pp. 597–613; John Durand, "Population Structure as a Factor in Manpower and Dependency Problems of Under-Developed Countries," *Population Bulletin of the United Nations*, No. 3 (1953), pp. 1–6; Clarence D. Long, *The Labor Force under Changing Income and Employment* (Princeton, 1958), pp. 144–158, Appendixes A and B; Gertrude Bancroft, *The American Labor Force* (New York, 1958), chap. 3; Robert L. Stein and Herman Travis, "Labor Force and Employment in 1960," *Monthly Labor Review*, 84 (1961), pp. 344–354; Jacob Schiffman, "Marital and Family Characteristics of Workers, March, 1960," *ibid.*, pp. 355–364.

It should be noted at least parenthetically that one indulges in somewhat spurious assertion when one declares that the labor participation rate is very much lower in developed than in underdeveloped countries among (say) males under 20 years of age and somewhat lower even among those aged 20–24. For most of those under 24 and not in the labor force are acquiring an education which will make them more productive later; and they cannot be so engaged and at the same time function as full-time members of the labor force. It is relevant from the economic point of view only that, given the rates and conditions under which capital is available for investment in education and otherwise, such investment be carried out as far as is warranted by the investment alternative present and by the direct and the indirect net increases in future output imputable to such educational investment. For such investment not only increases the productivity of individuals as such but also augments the pool of technical knowledge, strengthens rational behavioristic tendencies, and generally renders man's milieu more favorable to production. Countries differ in respect of the patterns of investment in education suited to their economic conditions; for countries differ in respect of capital scarcity and discount rates applicable, of income that must be foregone to acquire education, of the rate of increase in productivity associated with the rate of increase in educational investment, and so on.[40] In sum, then, discussions of the relation of age to labor-force participation need to take into account income-augmenting effects consequent upon nonparticipation in the labor force.

Of the two remaining determinants of the significance of changes in age composition for productivity, by far the most important is the response of the productive capacity of workers to changes in age. It is true that, particularly among the less skilled, unemployment varies somewhat with age, tending to be relatively high among both quite young and older workers, especially when unemployment is above normal, but this variation is essentially a function of social and economic organization rather than of the influence which age exercises upon a worker's psycho-physical capacities, his experience, etc. It is this influence, however, which, together with education, underlies the association of variation in productivity with variation in age. Here it will suffice to indicate that productivity generally rises to a peak in the 45–54 age group and then moves down gradually, or even to assume that it moves to a plateau in the 35–54 age group and then gradually descends. Given the pattern of the correlation of productivity with age, it is unlikely that changes in the age composition of the age group 15–64 (such as increase in the ratio of those aged 45–64 to those aged 15–44) will materially affect average output per member of the labor force; for productivity per person tends to be at least as high among those aged 60–64 or 60–69 as among those aged 15–24 under modern conditions.[41]

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[39] E.g., see Long, *op. cit.*, pp. 174–180; Bancroft, *op. cit.*, pp. 65–69.

[40] These matters will be treated in Gary S. Becker's forthcoming study of investment in education being done under the auspices of the National Bureau of Economic Research.

Changes in a population's age composition could be influenced by several circumstances that are, but that need not be, associated with such changes. First, when a society is technologically very dynamic, much of the knowledge acquired by older persons in their earlier years tends to become obsolete unless they continue to refresh their knowledge and replace the old by the new insofar as the latter is technologically and economically superior. Given a low G.R.R. and the prolongation of life in prospect, a larger than current fraction of "top" and "choice" decision-making posts could pass into the hands of relatively old persons governed by comparatively obsolete ideas and conceptions, particularly if selection for these posts were much affected by bias in favor of older persons, as well as by randomness. Should this gerontocratic result come about, the economy would be less progressive than it otherwise might be. This contingency may be guarded against through continuous provision for adult refresher training and education and through making social selection entirely dependent on prospective as well as on past capacity to perform.[42] It is perhaps well to remember, however, that in a traditional and quite static society in which the father has much to teach the son, many of the conditions present (e.g., high morbidity rates, high mortality, superstition, empirically untenable beliefs, etc.) make for the absence instead of the presence of that buoyancy and that set of conditions (e.g., long time-horizons, rationality of approach, good health, this-worldliness, etc.) which are so essential to technical progress.[43] Second, when fertility is very low and hence the rate of growth of the labor force is very low, it may be more difficult to preserve an optimum balance among occupations than when fertility is higher. For then there is relatively more need than in a growing labor force for interoccupational shifts, and the maintenance of optimum balance depends largely on the skill with which newly entering members of the labor force are directed into occupational areas in which labor-demand functions are shifting to the right. This problem, together with others associated with low rates of population growth, is readily solved; it is necessary only to apply the techniques at hand.[44]

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[41] During the past century the proportion of the labor force aged 45 or more years has risen, principally because of the decline in gross reproduction rates. Thus whereas in 1850 about 39–43 per cent of those in the age group 15–64 in then relatively developed countries were aged 45–64, by 1950 this percentage had risen to 47–54. See United Nations, *The Aging of Populations*, pp. 15–18, 54–56. This change has not, however, significantly affected average productivity per person falling within the age group 15–64. Output per worker is affected by many conditions other than age of worker. J. A. Mark's findings probably have wide applicability. He writes: "The relationship between age and job performance is by no means simple. . . . In the case of attendance, no relationship was found; for output per man-hour, although there were changes on the average associated with age, there was wide variability about the averages; and for continuity of service with the exception of the oldest group as age increased, the indexes generally increased." See "Comparative Job Performance by Age," *Monthly Labor Review*, 80 (1957), p. 1471; also his "Measurement of Job Performance and Age," *ibid.*, 79 (1956), pp. 1410–1414; and R. E. Kultsher and J. F. Walker, "Comparative Job Performance of Office Workers by Age," *ibid.*, 83 (1960), pp. 39–43. See also my "The Economic Effects of Changes in Age Composition," in Joseph J. Spengler and Otis Dudley Duncan, eds., *Demographic Analysis: Selected Readings* (Glencoe, Ill., 1956), pp. 497–517, esp. pp. 500–509; and A. Sauvy, *Théorie genérale de la population* (Paris, 1952), chaps. 6, 8; Sheldon, *op. cit.*, chaps. 4–5, 8. On the variety of structural, economic, and other factors which account for inter-firm differences in the hiring and the retiring of older workers, see Margaret S. Gordon, "The Older Worker and Hiring Practices," *Monthly Labor Review*, 82 (1959), pp. 1198–1205, and "The Older Worker and Retirement Policies," *ibid.*, 83 (1960), pp. 577–585; also Carl Rosenfeld, "Work Experience of the Population in 1960," *ibid.*, 84 (1961), pp. 1324–1337.

Man's ability to offset such retardation of income growth as is attributable to an unfavorable age composition is much greater today than it was 100–150 years ago. For today 50–75 per cent of all increase in aggregate output is attributable to increase in physical capital, to improvement in the education and training of the labor force, to technological progress, and (in some measure) to increase in scale—and other economies. These productive forces outweigh in importance both growth of the labor force and changes in its age composition. If these forces account for two-thirds of an annual increase of 3 per cent in aggregate output,[45] it does not take them long to increase income per capita by enough to offset, though not necessarily to eliminate, the growth-retarding effect of an initially suboptimal age composition. This inference may be illustrated as follows. Suppose that output per capita in country *L* is 5–15 per cent below that in country *H* because age composition is less favorable in *L* than in *H*, but postulate also that per capita income is rising very little in *H*. Under the circumstances stipulated and given that per capita income rises very little in *H* for a decade, it would take only 2–7 years for the productive forces described above to bring per capita income in *L* to a level approximating that in *H*. Even if technological conditions were the same in *L* as in *H* and per capita income were 5–15 per cent lower in *L* that in *H* solely because of differences in age composition, *L* could still bring its average income abreast of that in *H* by recourse to a combination of measures (e.g., accelerate rates of capital formation and technical progress; lengthen work-week; delay retirement; introduce more women into the labor force) designed to offset the growth-retarding influence of *L*'s unfavorable age composition.

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[42] For a fuller account of the problem, see my "Some Effects of Changes in the Age Composition of the Labor Force," *Southern Economic Journal,* 8 (1941), pp. 157–175. On the aging of elites, see also United Nations, *The Aging of Populations,* pp. 60–61.

[43] For an admirable comparison of traditional society in which death is at the center of life with a modern society, see Jean Fourastié, "De la vie traditionnelle à la vie tertiaire," *Population,* 14 (1959), pp. 417–432.

[44] See my papers cited in notes 41 and 42 above; the papers reprinted in Joseph J. Spengler and Otis Dudley Duncan, eds., *Population Theory and Policy* (Glencoe, 1956), pp. 234–301, and my "The Population Problem: Yesterday, Today, Tomorrow," *Southern Economic Journal,* 27 (1961), pp. 194–208. On how the rate of entry into and the rate of departure from the labor force varies with changes in the G.R.R. and life expectancy, respectively, see United Nations, *The Aging of Populations,* pp. 56–60.

Recourse to such counterbalancing measures tends to be more difficult when the source of unfavorable age composition is high fertility than when it is a combination of very high life expectancy (i.e., a life expectancy in or beyond the upper 70's) with very low fertility (i.e., a G.R.R. little above 1.0). When fertility is low, it is much easier to augment investment per capita than when fertility is high and population growth is absorbing a great deal of the capital being formed. It is less difficult to lengthen the workweek when this week is relatively short as is common in low-fertility countries than when it is relatively long as is more common in high-fertility countries. It is easier to defer retirement when age of retirement is typically low (say 60 or 65) as in low-fertility countries than when it is relatively high (say 70 or 75) as in some high-fertility countries. It usually is comparatively easier also to increase the relative number of women enrolled in the labor force when fertility is low, for then the claims per woman of childbearing and childrearing are lower than in high-fertility countries. In reality, of course, though male retirement age tends to be higher and female participation in the labor force tends to be lower in high-fertility than in low-fertility countries, other variables may intervene and weaken these associations.[46]

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[45] According to Moses Abramovitz, in the United States between 1869–78 and 1944–53 net national product increased 1,325 per cent, although the civilian labor force increased only 393 per cent and the input of civilian man-hours only 290 per cent. See *Resource and Output Trends in the United States Since 1870, Occasional Paper,* No. 52 (National Bureau of Economic Research, 1956), p. 8. I have used the term "attributable" above instead of the term "imputable" since I am dealing with change over time and not concerned with imputation as of a given time.

The burden of what has been said is to the effect that increase in the Struldbruggian component of modern populations, or in the relative number of dependent persons (i.e., those aged 0–14 and 60 or 65 and over), will not tend to reduce potential productivity per capita appreciably. Nor need prospective changes in age composition materially affect the over-all ratio of dependents to producers, or the dependency cost incident on the average producer. Up to now, of course, decline in fertility, together with increase in life expectancy, has not adversely affected this ratio. Furthermore, increase in working-life expectancy kept pace with that of retirement-life expectancy (i.e., separation from the labor force for reasons other than death) until recently, since the average number of years spent in retirement did not until recently begin to increase much faster than the average number spent working. About 1900 in the male population in the United States the ratio of retirement-life expectancy at age 20 to working-life expectancy at age 20 was .069; it had risen to 0.121 by 1947 and to .146 by 1958. By the year 2000 it could easily exceed 0.2. In other words, whereas in 1900 an American male did about 14 years work for each year spent in retirement, he may by the year 2000, if present life-expectancy and retirement trends continue, be doing only about 5 years of work for each year he spends in retirement. It is doubtful that, should he spend so large a portion of his post-19 lifetime in idleness, he can provide for his needs during retirement at a rate commensurate with his wants, tastes, etc. Under the circumstances, therefore, there may be political pressure for greater support of retired persons by the state, and this could result in both inflationary financing and a decrease in the rate of capital formation. It could happen, of course, if such outcome became likely, that steps would be taken to defer retirement and extend the length of working life as much as would be necessary to prevent an intolerable decline in the per capita income of persons in their 60's.[47] Those in the younger age groups, upon whom the cost would largely fall should employment not be expanded enough to absorb young and old workers alike, would be motivated to exercise counter-political pressure in favor of earlier retirement at moderate levels of retirement pay, with the result that age differences could become a politically divisive factor. The solution, of course, consists in expanding employment enough to accommodate all job seekers, a not too difficult task.

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[46] On male retirement age and female labor-force participation rates in advanced and underdeveloped countries, see United Nations, *The Aging of Populations*, pp. 52–60; A. J. Jaffe and C. D. Stewart, *Manpower Resources and Utilization* (New York, 1951), chap. 16; International Labour Office, "The World's Working Population," Part I, *International Labour Review*, 73 (1956), pp. 152–176, and "Population and Labour Force in Africa," *ibid.*, 84 (1961), pp. 499–514.

Changes in age composition produce changes in the ratio of dependents to producers and these in turn exercise some influence on fertility, on length of working-life, and on the provision made for dependents. (*a*) Let us suppose that a girl marries at age 18–20, lives in this state for at least 20 years, has a first child a year later, has 6 more at intervals of about 2 years, and may have 2 more at intervals of about 3 years. If half these children die in the first 5 years as happens when life expectancy at birth is in the lower 20's, only 3 or 4 children would be living at the close of the mother's effective child-bearing period. This number might be as high as 5–6, 6–7, and 7–8, respectively, if life expectancy were approximately 30, 45, or 60. If, furthermore, children entered the labor force when 10 years of age, the maximum number of dependent children in a family at any time, given these four life expectancies, would be about 2, 3–4, 4, and 5, respectively. If, however, children could not enter the labor force until the sixteenth year, the maximum number of child-dependents would rise to about 4, 5, 6, and 7. Hence both increase in life expectancy and deferment of entry into the labor force increase the dependency burden imposed by children upon parents. (*b*) That a larger fraction of males under 20, 55–64, and 65 and over remains enrolled in the labor force in high-fertility than in low-fertility countries is attributable in part to the comparative lowness in high-fertility countries of the percentage of the population in the age group 15–59 (or 15–64) and the consequence that potential and actual per capita productivity is relatively low; but it is attributable also to the agricultural and less-urban character of the economies found in high-fertility countries.[48] (*c*) Since the needs of dependents vary somewhat with age, changes in the age composition of the dependent population may affect the ratio of needs to dependents, though the general level of needs per dependent is determined largely by socio-economic circumstances not immediately connected with age of dependents.[49] These changes may also affect the attitude of producers toward dependents in that more satisfaction tends to be derived from the support of young than from that of old dependents.

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[47] In 1900–1902 male working-life expectancy at age 20 and retirement-life expectancy at age 20, respectively, were 39.3 and 2.7. The corresponding figures were 42.8 and 5.2 in 1947, 43.1 and 6.3 in 1958, and (as estimated in 1955) 45.1 and 8.7 or higher in 2000. Life expectancy and working-life expectancy at birth were 47.9 and 31.1 in 1900–1902, 64.2 and 41.6 in 1947, 66.4 and 42.3 in 1958, and (as estimated in 1955) 73.2 and 45.1 in 2000. See S. Garfinkle, "Changes in Working Life of Men, 1900 to 2000," *Monthly Labor Review,* 78 (1955), pp. 297–300, reprinted in Spengler and Duncan, *Demographic Analysis*, pp. 104–107, and unsigned, "Health and Working Life," *Progress in Health Services,* 10 (April, 1961), pp. 1–5. See also on length of working-life and its relation to life expectancy S. L. Wolfbein, "The Length of Working Life," *Population Studies,* 3 (1949), pp. 286–294; and "The Length of Working Life," a paper presented at the Fourth International Gerontological Congress, Merano, Italy (July, 1957); Leif Johansen, "Death Rates, Age Distribution and Average Income in Stationary Populations," *Population Studies,* 11 (1957), pp. 64–77; and John Durand's comparative tables in "Population Structure . . . ," *loc. cit.,* pp. 9–13. Johansen, working with a stationary-population model, concluded that as average lifetime increased the upper limit of productive ages needed to increase in order to make possible an appreciable increase in average income. See *op. cit.,* pp. 76–77. Koya Azumi finds that the ratio among men of postretirement life expectancy to work-life expectancy in Japan is rising much as it has in the United States. See "Length of Work Life of Japanese Men, 1930 and 1955," *Monthly Labor Review,* 81 (1958), pp. 1366–1368.

4. CONCLUSION

Several inferences may be drawn in addition to the conclusions presented in various parts of this essay. (1) Population aging in the sense of increase in the proportion of the population aged 65 and over will continue in most parts of the world, but particularly in what are now high-fertility countries. (2) It will be the result primarily, as in the past, of decline in fertility, though it may also be occasioned in some measure in low-fertility countries by decline in mortality, if, contrary to expectations, the average duration of life is permitted to move into and even beyond the upper 70's. (3) Population aging does not tend to be accompanied by increase in the ratio of a population's dependency burden to its capacity to support such burden, even under *ceteris paribus* conditions; for increase in the relative number aged 65 and over usually is accompanied by decrease in that under 15 and by increase in that 15–64. Only if fertility is very low and life expectancy rises much above present levels is there a tendency for the ratio of persons of dependent age to persons of productive age to rise. (4) The movement of per capita income is determined predominantly by circumstances other than changes in age composition. (5) The real cost of providing support for persons of dependent age is determined largely by circumstances unconnected with age structure as such, that is, by the level and distribution of income, by the pattern of tastes, by the emphasis being put upon economic growth, and so on. (6) It is easy to modify a population's age structure, in that only the Gross Reproduction Rate needs to be modified appreciably. (7) It is very easy for a low-fertility population to introduce economic measures which offset increases in the relative number of persons aged less than 15 or more than 64 years, but it is not so easy for a high-fertility population to take countervailing measures. The latter has little recourse except to reduce its fertility.

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[48] E.g., see Durand, "Population Structure . . . ," *loc. cit.*, pp. 9–15.

[49] For a discussion of the variation of "needs" with age, see United Nations, *The Aging of Populations*, pp. 61–81.

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III. EMPLOYMENT OF OLDER WORKERS

A. LABOR REQUIREMENTS AND LABOR SUPPLY, 1970 AND 1975

1. INTRODUCTION

The employment problem of older workers has become the subject of an expanding body of research, presumably motivated by the fact that "an increasing number of aging men and women have no wish to fall away prematurely from the status, the social background and the inherent satisfactions of gainful employment." [1] The anxieties created for the man or woman approaching retirement, and the psychological hazards confronting the man who, having reached the conventional retirement age, faces what may appear to him to be a purposeless existence for another eight years, have been the source of extensive study during the past decade.

The major cause of these anxieties is probably the loss of income normally accompanying retirement, although the loss of job status may be influential as well. Income usually drops sharply upon retirement of the family head, despite the cushioning effects of public and private retirement benefits; and older people cite this reduction in income as the most compelling argument for continuing to work.[2]

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1. F. le Gros Clark, "Research on Employment," *Cross-National Surveys of Old Age,* International Association of Gerontology, 1956, p. 45.
2. Edna C. Wentworth, "Why Do Beneficiaries Retire? Who Among Them Return to Work?" *Social Security Bulletin,* 18 (1955), pp. 3–12.

Policies leading to an improvement in the income and employment prospects of older people are thus crucial to the solution of their basic problems—economic, psychological, and social.

Increased income from current earnings would help to solve the aged's financial problems. Also to the extent that older people are employed in addition to, rather than in lieu of, other workers, their employment would contribute to an increase in the total output of goods and services and thus represent a net economic gain to society. Retention of workers beyond the usual retirement age might provide higher standards of living, measured in terms of goods and services; but it would do so only at the expense of reduced leisure for older people. More fundamentally, however, a gain in national product attributable to increased labor-force participation of older persons can occur only when these persons are a *net addition* to the work force, i.e., when their retention past retirement age is not accompanied by a corresponding reduction in the number of jobs available for younger workers. A rapidly growing aggregate demand for goods and services, which is also reflected in a growth in the demand for labor, would therefore seem to be the critical factor.

The future prospect for employment of older workers, being only a part of the long-run expectation regarding the total labor requirement, is therefore largely dependent on the rate of economic growth and the rate of growth in output per man hour. But while the expected rate of growth is an important factor contributing to the long-run demand for the services of older persons, the growth rate alone does not completely explain changing employment. A study of the growth in the *size* of total product must be accompanied by a study of changes in the *composition* of that product, since a change in the composition of demand may lead to a substantial change in the aggregate demand for labor. Demand may, for example, shift from goods requiring relatively large amounts of labor to goods produced in almost completely mechanized plants. Or industrial shifts resulting in the use of less labor of a particular age group may occur; a reduction in the relative importance of farming, for example, has apparently reduced employment opportunities for older men.[3]

Estimates of future labor-force requirements that rely on a straightforward extrapolation of the trend in gross national product consequently ignore two important factors: changes in the composition of aggregate demand, and differential rates of productivity increase among the various output sectors. In attempting to incorporate these features in employment forecasts, the present study makes separate projections of national income originating in each of the sixty-two sectors of the economy corresponding to the National Income Division industrial classification. Dividing projected sector income by the projected average output per worker per year, one obtains an estimate of the number of workers required by that sector in the terminal years 1970 and 1975, on the assumption that the present workweek is continued. Aggregation of these individual estimates yields an estimate of the total labor-force requirements at the selected future dates. These estimates of the demand for labor are then compared with existing projections of the labor force available in 1970 and 1975.

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[3] John D. Durand, *The Labor Force in the United States, 1890–1960* (New York: Social Science Research Council, 1948), pp. 110–111.

Labor-force projections for 1970 and 1975 are presented in Section 2, while Section 4 contains projections of national income originating in each of the sixty-two industrial sectors. Similarly, Section 5 presents projections of average output per worker by industrial sector. The forecasts of employment for 1970 and 1975, set forth in Section 6, emphasize two aspects of the study: one, the changing industrial composition of employment as reflected by the differential rates of growth in both income by sector of origin and in average output per worker in the various sectors; two, a rough measure of the imbalance between labor-force availability and the aggregate demand for labor at the selected future dates.

Summarizing the intersectoral employment comparisons, we found that of the sixty-two industries, twenty are expected to experience declines in employment over the 1959–70 period. These industries are rather heavily concentrated in the broad classification "Construction and Manufacturing." Agricultural and Extractive Industries, Transportation, and Service Trades and Recreation account for the remaining sectors in which a decline in the number of "full-time equivalent" employees is anticipated. Secondly, twenty other industries are expected to experience increases in employment, but only at rates below the average rate of increase in employment for the economy as a whole. Again, these industries are relatively heavily concentrated in Construction and Manufacturing, with some representation from all other broad groups except Professional Services. Third, employment in twelve industries scattered throughout the broad industrial classification is expected to grow at a rate approximately the same as the national average. The Professional Services and Government sectors, however, have only minor representation in this group. Finally, ten industries have projected employment growth rates in excess of the expected national average; and in this group, the Government and Professional Services sectors dominate. Furthermore, none of the manufacturing and construction industries is included in this category. These intersectoral employment comparisons thus indicate a decline in the relative importance of all the major industrial classifications except Professional Services and Government.

Considering the over-all balance of labor supply and labor requirements, we find that the projected rate of unemployment is about 8 per cent for 1970 and about 10 per cent in 1975. The pattern of unemployment since the end of World War II reveals an upward trend of some significance. Eight per cent unemployment seems high; but a continuation of the "stairstep effect" experienced since 1947 makes this rate appear less unreal, although no less alarming. This forecast is subject to the qualifications which are stated explicitly in subsequent portions of the paper.

The comparisons afforded by this study are, of course, made with respect to the projected pattern of demand for and supply of all labor. The projections are concerned with the employment prospects for older workers only within this context. But the implications for older workers are obvious. The long-run decline in labor-force participation rates of older men has been interrupted in recent decades only by the sharp increase in demand for labor attributable to the unusual conditions prevailing during World War II, after which the rate resumed its downward trend. Furthermore, in the growing residue of unemployment left by the recessions of 1957–58 and 1960–61, the older worker has been particularly prominent. A projection of future labor requirements falling considerably short of the projected labor availability raises the question of adequate job opportunities for all workers; but the question is of particular significance to the older, and apparently somewhat more marginal, worker.

Within the context of total employment prospects, retirement policy is of paramount importance. Recent governmental action designed to permit earlier retirement reflects a recognition of the growing imbalance between the size of the available labor force and the aggregate demand for labor services. As an alternative to policies of retirement before age 65, or mandatory retirement at 65, reductions in the size of the labor force could be achieved through reductions in the length of the workweek or by postponing entrance into the labor force through an extension of the years spent in school. Either type of policy would shift the initial cost of unemployment; but the final incidence might not be noticeably different from what it is at present. The choices of policy are ones governing *when* society wishes to take an apparently increasing amount of leisure and whether the choice of time is to be voluntary or compulsory.

Policies designed to reduce the size of the labor force approach the problem only from one side. A more attractive solution—on the assumption that we prefer goods to leisure—lies in the possibility of stimulating the demand for labor through an increased demand for goods and services. Demand for goods and services from the public (governmental) sector would meet obvious social needs, and the demand for goods and services consumed privately is limited only by income. The extent to which a given increase in demand for goods and services leads to an increased demand for labor, however, is largely dependent on the composition of the augmented final demand. An increase in demand for educational or medical services, for example, constitutes a direct demand for the labor involved. On the other hand, an increased demand for manufactured goods may lead to proportionately much smaller increases in the demand for labor. Increased demand for the latter category of goods, most of which are produced under progressively more highly mechanized conditions, may be met primarily through a fuller utilization of existing capital facilities or through expansion and improvement of these facilities, with only a relatively small increase in the amount of labor employed. Thus, in order for the second type of policy to be effective, it may be necessary either to provide quite a substantial stimulus to the demand for goods and services, or else for the composition of this demand to be directed toward goods and services which, being less subject to the march of technology, continue to use relatively large amounts of labor.

The possibility of maintaining a balance between labor supply and total labor requirements through increases in demand for manufactured goods is therefore less promising than it has been in the past. Moreover, the labor-intensive sectors—largely services—require labor of such skills, training, and education that the manufacturing worker may have little access to these jobs. Again, the older worker is particularly vulnerable; he is likely to be the last man considered for job retraining.

The possibility of a long-run excess supply of labor nevertheless suggests that policies designed to stimulate effective demand are essential to the problem's solution. Past research on retirement policy, and in particular on the retirement policies of particular industries and firms,[4] has isolated certain variables that appear to be significant. But they are significant only within the broad context of the rate of economic growth and the pattern of technological development.

2. LABOR-FORCE PROJECTIONS: 1970 AND 1975

Two major factors determine the quantity of labor available at a particular time: the number of people who are old enough to work (by definition, 14 years or older), and the proportion of this group who are able to work and wish to do so. An estimate of the future labor force must be based on a forecast of these factors.

a. *Population Projections*

The size of the population at any time in the future is a function of the current size of the population, the birth rate, the death rate, and net immigration. Assuming that current population can be determined with some degree of accuracy by a complete census or by the use of appropriate sampling techniques, the demographer must predict the remaining variables.

Traditionally, projecting the birth rate has been the most troublesome element, largely because its behavior is governed by relatively unpredictable private decisions which, when aggregated, do not act with statistical regularity. However, the birth-rate projection is not a major problem when forecasting the number of people who will be old enough to work 15 years in the future; and it presents no problem at all in forecasting this number 10 years ahead. An error of 2.5 millions in the estimated number of births for 1960–61, or an error of more than 50 per cent in terms of 1959–60 births, would make a difference in the labor-force projection for 1975 of less than 0.8 million persons, under the assumption that all of these people survive to age 14 and that their participation in the labor force is the same as that of the 14- to 17-year-old group in 1957. The 14-year-old, however, is much less likely to be in the labor force than the 15–17-year group, largely because of federal and state laws regulating employment of minors and enforcing school attendance. Since most of the 14-year-old people in 1975 will be attending school, most of those who want to work will be able to hold only part-time jobs. Allowing for a 10 per cent error in the estimate of births, and counting two of these 14-year-olds as one full-time available worker, the error in the labor-force projection for 1970 would be zero. In 1975 it would be less than 100,000 laborers. For projections of this length, the major effect of the birth rate is not on the number of people who will be old enough to work; instead, its principal effect is on the ability and desire of women in the fertile ages to participate in the labor force.

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[4] Margaret Gordon, "The Older Worker and Retirement Policies," *Monthly Labor Review,* 83 (1960), pp. 577–585; and Juanita M. Kreps, "A Case Study of Variables in Retirement Policy," *Monthly Labor Review,* 84 (1961), pp. 587–591.

The Census Bureau has prepared four series of estimates of the population of the continental United States in future years on the basis of different assumptions about the birth rate.[5] The assumptions for the four series are: (*a*) Series I: the fertility rate for the period 1958 to 1980 will average 10 per cent above the 1955–57 level; (*b*) Series II: the fertility rate will remain constant at the 1955–57 level; (*c*) Series III: the rate will decline from the 1957 level to the 1949–51 level by 1965–70 and will remain constant thereafter; and (*d*) Series IV: fertility will fall from the 1955–57 level to the 1942–44 level by 1965–70 and remain unchanged.[6] The fertility rate used was the Gross Reproduction Rate, i.e., the number of female children born during a woman's childbearing years.

For our purposes, the size of the population in 1961 is of more interest than its size in 1970 or 1975, since babies born after 1961 are not considered as a potential part of the labor force in 1975. Therefore, we used the population series that gave the best estimates for 1960, under the assumption that the ones giving the best results for 1960 would also give the best results for 1961. Series II and III are the ones selected on the basis of this criterion. They imply, respectively, an annual average crude birth rate of 24.70 and 24.30 per 1,000 for the 1955–60 period.[7] The actual average was 24.58.[8] The population forecasts associated with these two series for July, 1960, were 180.1 and 179.8 million respectively.[9] The estimate consistent with the 1960 census is 179.9 million.[10]

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[5] Meyer Zitter and Jacob S. Siegel, "Illustrative Projections of the Population of the United States, By Age and Sex, 1960 to 1980," *Current Population Reports,* Series P-25, No. 187 (Washington: U. S. Bureau of the Census, 1958).

[6] *Ibid.,* p. 8.

Since death rates are easier to predict than birth rates, the Census Department used only one death rate in estimating the population. The rate used was an average of the high and low rates forecast in *Actuarial Study No. 46.*[11] In this study causes of death were classified into 10 groups. A high estimate and low estimate of death from each cause for each age group was made for the year 2000. Both the high and the low estimates assume an improvement in health and medical care, thus leading to some decline in the death rate. The low forecast predicts a death rate in the year 2000 ranging from zero per cent of the 1953 rate for tuberculosis to 90 per cent for cancer, diabetes, heart diseases, and congenital malformations. The high estimate forecasts a death rate varying from 10 per cent of the 1953 rate for tuberculosis to 100 per cent for cancer, heart diseases, congenital malformations, and accidents, suicide, and homicide.[12]

The death rate used resulted in a predicted crude death rate of 9.20 per 1,000 for the 1955–60 period.[13] The actual rate was 9.46 per 1,000,[14] indicating that the decline in the death rate has not been as rapid as expected. However, a continuation of the 1955 death rates would increase deaths by less than 2 million in all ages by 1975. Since a large number of these would presumably be in the over-65 group, however, use of the 1955 death rates would probably result in a difference in the labor-force estimate of less than 0.5 million in 1975.

Net immigration was assumed to be the same for all series, namely 300,000 per year. The average for the period 1951–60 was 298,200; for 1958–60, it was 303,700.[15] The age-sex distribution of immigrants was assumed to be the same as for the 1951–56 period. Although there are relatively large variations around the means of these series, legal restrictions on immigration prevent substantial absolute changes.

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[7] *Ibid.,* p. 10.

[8] "Estimates of the Population of the United States and Components of Population Change: 1946 to 1960," *Current Population Reports,* Series P-25, No. 223 (Washington: U. S. Bureau of the Census, 1961).

[9] Zitter and Siegel, *op. cit.,* p. 16.

[10] "Estimates of the Population of the United States and Components of Population Change: 1940 to 1960," *loc. cit.,* p. 4.

[11] T. N. E. Greville, "Illustrative United States Population Projections," *Actuarial Study No. 46* (Washington: Social Security Administration, 1957).

[12] *Ibid.,* pp. 10–12.

[13] Zitter and Siegel, *op. cit.,* p. 13.

[14] "Estimates of the Population of the United States and Components of Population Change: 1940 to 1960," *loc. cit.,* p. 2.

[15] *Ibid.,* p. 4.

Under the conditions just described, Series II and Series III give the population forecasts shown in Table 1.

Table 1. Population 14 Years and Over

Year	Series II (*thousands*)	Series III (*thousands*)
1960	126,528	126,528
1965	138,127	138,127
1970	150,691	150,691
1975	164,266	163,704

Source: Meyer Zitter and Jacob S. Siegel, "Illustrative Projections of the Population of the United States, By Age and Sex, 1960 to 1980," *Current Population Reports*, Series P-25, No. 187 (Washington: U. S. Bureau of the Census, 1958).

b. *Participation Rates*

The accuracy of any estimate of the labor force for two decades or less in the future depends mainly on the forecaster's ability to make an accurate prediction of the proportion of the people who will be able and will desire to work. Prior to 1940, a popular belief maintained that there was a "normal" percentage of any particular age group *available* for work.[16] Changes in these "normal" rates were thought to be slow and fairly predictable. The advent of World War II, however, brought about far-reaching changes in the participation rates of particular groups, especially women; and the rates for these groups have not returned to the levels formerly regarded as normal.

A priori, one may also argue that there is a functional relationship between the supply of and demand for labor. That is, the desire to participate in the labor force may be influenced by the level of economic activity. This effect is likely to be important only insofar as the fringe members of the labor force are concerned, particularly married women with children and older people. In periods of high employment and high wages, these groups may find the labor market so attractive that they enter the labor force. For example, the 62.2 per cent participation of all people 14 and over in April, 1945, may be partially explained by this phenomenon. Between 1940 and 1945 there was a large increase in the participation of males 65 and over and of women in the age group from 35 to 54. Much of the increase in the participation of younger males was, of course, involuntary, owing to their induction into military service at a time when they would otherwise be in school.

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[16] See Gertrude Bancroft, *The American Labor Force: Its Growth and Changing Composition* (New York: John Wiley and Sons, Inc., 1958), p. 131; and "Projections of the Labor Force in the United States, 1955 to 1975," *Current Population Reports*, Series P-50, No. 69 (Washington: U. S. Bureau of the Census, 1956), pp. 1–2.

It is also possible that periods of low employment and low wages bring increases in the participation of wives and younger family members since some of the family heads or primary earners are without jobs. Conversely, it might also be argued that periods of depressed economic activity tend to reduce over-all participation through voluntary withdrawal from the labor force. This might come about because some people are not willing to work at prevailing wages, because young people decide to continue in school rather than enter the labor force at an adverse time (the cost involved, however, should make this negligible), and because older people become discouraged when jobs are unavailable and decide to retire. The annual data obtainable for the decade of the 1930's are so fragmentary that it is impossible adequately to test either of these extreme hypotheses. Such data as are available, however, indicate that there was almost no change in the over-all participation rate during these years.[17]

Whether the magnitude of unemployment predicted here would have a dampening effect upon the participation rate is a different matter. The beginning of social security and the extension of private pension plans in the last three decades may induce earlier retirement and depress the participation of older people in the future, especially if job shortages occur. However, since people of retirement age have indicated their willingness to remain employed because of the income factor, this may be considered a form of involuntary unemployment. But if there is a positive correlation between the level of economic activity and the size of the labor force, the forecasts of the Department of Labor and of the Census Bureau will be too great; as a consequence, our predicted rate of unemployment will also be too large.

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[17] Durand, *op. cit.*, pp. 96–102.

It is difficult to predict the percentage of any particular age and sex group that will be in the labor force at a future date. However, it is much easier to estimate the percentage of population over 14 that will be in the labor force. Despite the rather significant decreases in the participation rates of men over 65 (from 57.1 per cent in 1920 to 32.3 per cent in 1960) and of men under 19 (from 55.9 per cent in 1920 to 46.3 per cent in 1960), the percentage of the total population in the labor force has been rather constant: 55.8 per cent in 1920, 56.8 in 1950, 58.0 in 1955, and 57.7 in 1960. The increased participation of women in the labor force—particularly women in the age range from 35 to 65, whose actual participation rate more than doubled from 1920 to 1957—offset the declining participation rates of older men and of men under 19. It thus seems that demographic factors, in particular the number of persons over 14 years, are of primary importance in determining the labor force available in 1970 and 1975. On the other hand, socio-economic factors are of primary importance in determining the age-sex composition of the labor force.

We have chosen to use two forecasts of participation rates published by the Census Bureau and one forecast published by the Labor Department. The Census Bureau made straight line extrapolations of the rates of change in the participation rate for each age and sex group from 1920 through 1954, 1955, and 1956 (hereafter called participation rate A) and the same type of extrapolation for the period 1950–55 (hereafter called participation rate B).[18] The forecasters at the Labor Department, on the other hand, did not bind themselves to rigid rules requiring the use of specific years or a specific type of statistical fit. Thus the judgment of the forecasters played an important role in determining the particular participation rate.[19] This rate is hereafter referred to as participation rate C.

Applying these rates to the population projections for 1970, A and B indicate that 57.9 per cent of persons over 14 years will participate in the labor force; rate C gives a participation of 57.8 per cent. In terms of the total labor-force estimate, there is little difference between the rates, the absolute difference being less than 175,000 workers.

However, there are considerable differences in the estimates of the

[18] "Projections of the Labor Force in the United States, 1955 to 1975," *loc. cit.*

[19] "Population and Labor Force Projections for the United States, 1960 to 1975," Bulletin No. 1242 (Washington: U. S. Dept. of Labor, 1959).

number of workers in a particular age or sex group. If the rates of change from 1920 through 1954, 1955, and 1956 continue until 1970, one out of every three males 65 and over (2.8 millions) will be in the labor force. A continuation of the rates of change from 1950–55, on the other hand, would show only one in four of this group (2.1 millions) in the labor force in 1970.

On the basis of 1960 projections, rate B is best. The average absolute difference between the projected rates for 1960 and the actual rate is 1.31 per cent for rate A, 0.80 per cent for rate B, and 1.06 per cent for rate C. In seven of the fourteen age-sex groups, the projections differed by 10 per cent or more in 1960. Rate B gave the smallest error in five of these groups in 1960, while rates A and C gave the smallest error in one group each.

In summary, these tests indicate that rate B—which predicts the most rapid declines in the participation of males under 20 and over 65 in the labor force, and the most rapid increases in the participation of females 45–54 and 55–64—will give the best age-sex distribution of the labor force in 1970. The tests furthermore indicate that the differences in the estimate of the total labor force are insignificant. The data for these tests are shown in Tables 2–4.

c. *Labor Force Estimates*

Applying the projected participation rates to the population estimates, we obtain forecasts of the labor force for 1970 and 1975. The forecasts for 1970 vary from 87,092,000 to 87,283,000, while those for 1975 range from 94,775,000 to 95,683,000 (Tables 5–10). In order to obtain an estimate of the supply of labor, one must adjust these labor-force estimates to allow for those workers who have no desire to work full time. The construction of participation rates is such that these workers would present no problem if they worked full time during the months in which they are counted as a part of the labor force. Since the monthly figures are averaged, a person who works only one month would be counted as one-twelfth of a person.

However, a considerable proportion of employed persons (17 per cent in 1955) actually work less than 35 hours per week. Some of these work less than full time because they cannot obtain full-time work. For this group no adjustment is necessary. In terms of labor supply, they are in fact full-time workers since they are willing to work full time. Others work less than full time through choice. Among these are students and housewives, who may not be able to

Table 2. Participation Rate A

	Actual		Predicted		
	1955	1960	1960	1970	1975
Male					
14–19	49.0	46.3	47.5	44.7	43.4
20–24	89.5	88.9	89.3	88.9	88.7
25–34	96.5	96.4	96.5	96.6	96.6
35–44	96.9	96.5	96.9	97.0	97.0
45–54	95.1	94.5	95.2	95.5	95.6
55–64	86.4	85.4	86.3	86.1	86.0
65 up	38.5	32.3	36.5	32.8	31.1
Female					
14–19	29.7	30.2	29.2	28.3	27.9
20–24	45.8	46.0	47.6	50.9	52.5
25–34	34.8	35.9	36.9	40.8	42.7
35–44	41.4	43.2	44.2	49.3	51.7
45–54	43.5	49.4	46.1	51.0	53.3
55–64	32.2	36.8	34.4	38.7	40.8
65 up	10.3	10.5	10.6	11.1	11.4

Source: Actual 1955, Predicted 1960, 1970, and 1975 from *Current Population Reports*, Series P-50, No. 69, p. 12; Actual 1960 from Robert L. Stein and Herman Travis, "Labor Force and Employment in 1960," *Monthly Labor Review*, 84 (1961), p. 349.

Table 3. Participation Rate B

	Actual		Predicted		
	1955	1960	1960	1970	1975
Male					
14–19	49.0	46.3	45.9	41.6	40.1
20–24	89.5	88.9	88.2	85.7	84.5
25–34	96.5	96.4	96.8	97.3	97.5
35–44	96.9	96.5	97.3	98.0	98.3
45–54	95.1	94.5	95.7	96.7	97.1
55–64	86.4	85.4	87.4	89.2	90.0
65 up	38.5	32.3	33.4	25.1	21.8
Female					
14–19	29.7	30.2	28.8	27.6	27.0
20–24	45.8	46.0	45.5	45.0	44.8
25–34	34.8	35.9	35.0	37.0	38.1
35–44	41.4	43.2	43.4	48.2	50.5
45–54	43.5	49.4	49.2	58.6	62.7
55–64	32.2	36.8	37.5	46.5	50.3
65 up	10.3	10.5	11.2	12.9	13.8

Source: Actual 1955, Predicted 1960, 1965, and 1970 from *Current Population Reports*, Series P-50, No. 69, p. 12; Actual 1960 from Stein and Travis, *op. cit.*

Table 4. Participation Rate C

	Actual		Predicted		
	1955	1960	1960	1970	1975
Male					
14–19	49.0	46.3	47.9	46.6	46.9
20–24	89.5	88.9	88.1	86.3	86.0
25–34	96.5	96.4	96.5	96.5	96.5
35–44	96.9	96.5	96.9	96.9	96.9
45–54	95.1	94.5	95.1	95.1	95.1
55–64	86.4	85.4	86.4	86.4	86.4
65 up	38.5	32.3	36.0	32.2	31.0
Female					
14–19	29.7	30.2	28.6	27.8	27.9
20–24	45.8	46.0	45.4	45.2	45.2
25–34	34.8	35.9	37.9	38.9	39.1
35–44	41.4	43.2	43.0	47.0	47.9
45–54	43.5	49.4	48.2	54.5	56.0
55–64	32.2	36.8	37.4	43.0	44.4
65 up	10.3	10.5	11.0	12.2	12.6

Source: Actual 1955 from *Current Population Reports,* Series P-50, No. 69, p. 12; Actual 1960 from Stein and Travis, *op. cit.;* Predicted 1960, 1970, and 1975 from "Population and Labor Force Projections for the United States, 1960 to 1975," Bulletin No. 1242, U. S. Dept. of Labor, 1959, p. 54.

Table 5. Labor-Force Projections, Population Series II, Participation Rate A *(in thousands)*

	1960	1970	1975
Total	73,322	87,265	95,683
Male			
14 up	50,043	57,539	62,357
14–19	3,904	5,310	5,581
20–24	5,093	7,815	8,687
25–34	10,913	12,185	15,138
35–44	11,367	11,010	10,951
45–54	9,691	10,770	10,975
55–64	6,477	7,694	8,145
65 up	2,598	2,755	2,880
Female			
14 up	23,279	29,726	33,326
14–19	2,323	3,237	3,455
20–24	2,669	4,353	5,007
25–34	4,249	5,144	6,636
35–44	5,415	5,738	5,913
45–54	4,917	6,134	6,486
55–64	2,788	3,882	4,391
65 up	918	1,238	1,438

Table 6. Labor-Force Projections, Population Series III, Participation Rate A (*in thousands*)

	1960	1970	1975
Total	73,322	87,265	95,481
Male			
14 up	50,043	57,539	62,233
14–19	3,904	5,310	5,457
20–24	5,093	7,815	8,687
25–34	10,913	12,185	15,138
35–44	11,367	11,010	10,951
45–54	9,691	10,770	10,975
55–64	6,477	7,694	8,145
65 up	2,598	2,755	2,880
Female			
14 up	23,279	29,726	33,248
14–19	2,323	3,237	3,377
20–24	2,669	4,353	5,007
25–34	4,249	5,144	6,636
35–44	5,415	5,738	5,913
45–54	4,917	6,134	6,486
55–64	2,788	3,882	4,391
65 up	918	1,238	1,438

Table 7. Labor-Force Projections, Population Series II, Participation Rate B (*in thousands*)

	1960	1970	1975
Total	73,287	87,283	95,582
Male			
14 up	49,846	56,858	61,495
14–19	3,776	4,942	5,152
20–24	5,030	7,534	8,276
25–34	10,947	12,273	15,279
35–44	11,414	11,124	11,098
45–54	9,742	10,906	11,147
55–64	6,559	7,971	8,524
65 up	2,378	2,108	2,019
Female			
14 up	23,441	30,425	34,087
14–19	2,291	3,152	3,347
20–24	2,553	3,852	4,271
25–34	4,029	4,670	5,918
35–44	5,314	5,605	5,773
45–54	5,246	7,047	7,632
55–64	3,040	4,660	5,411
65 up	968	1,439	1,735

Table 8. Labor-Force Projections, Population Series III, Participation Rate B (*in thousands*)

	1960	1970	1975
Total	73,287	87,283	95,393
Male			
14 up	49,846	56,858	61,385
14–19	3,776	4,942	5,042
20–24	5,030	7,534	8,276
25–34	10,947	12,273	15,279
35–44	11,414	11,124	11,098
45–54	9,742	10,906	11,147
55–64	6,559	7,971	8,524
65 up	2,378	2,108	2,019
Female			
14 up	23,441	30,425	34,008
14–19	2,291	3,152	3,268
20–24	2,553	3,852	4,271
25–34	4,029	4,670	5,918
35–44	5,314	5,605	5,773
45–54	5,246	7,047	7,632
55–64	3,040	4,660	5,411
65 up	968	1,439	1,735

Table 9. Labor-Force Projections, Population Series III, Participation Rate C (*in thousands*)

	1960	1970	1975
Total	73,550	87,092	94,775
Male			
14 up	49,971	57,443	62,353
14–19	3,939	5,534	5,896
20–24	5,024	7,587	8,423
25–34	10,913	12,173	15,123
35–44	11,367	10,999	10,940
45–54	9,681	10,725	10,917
55–64	6,484	7,721	8,183
65 up	2,563	2,704	2,871
Female			
14 up	23,579	29,649	32,422
14–19	2,276	3,180	3,374
20–24	2,546	3,866	4,311
25–34	4,364	4,905	6,077
35–44	5,268	5,470	5,478
45–54	5,141	6,555	6,814
55–64	3,031	4,313	4,779
65 up	953	1,360	1,589

Table 10. Labor-Force Projections, Population Series II, Participation Rate C (*in thousands*)

	1960	1970	1975
Total	73,550	87,092	94,991
Male			
14 up	49,971	57,443	62,488
14–19	3,939	5,534	6,031
20–24	5,024	7,587	8,423
25–34	10,913	12,173	15,123
35–44	11,367	10,999	10,940
45–54	9,681	10,725	10,917
55–64	6,484	7,721	8,183
65 up	2,563	2,704	2,871
Female			
14 up	23,579	29,649	32,503
14–19	2,276	3,180	3,455
20–24	2,546	3,866	4,311
25–34	4,364	4,905	6,077
35–44	5,268	5,470	5,478
45–54	5,141	6,555	6,814
55–64	3,031	4,313	4,779
65 up	953	1,360	1,589

work full time because of other commitments, and some older perple, who may restrict their work time in order to qualify for Social Security benefits.

Gertrude Bancroft found that from 1949 to 1956 approximately 16 per cent of employed persons worked less than 35 hours per week.[20] There is also some evidence of an increase in part-time work, since the average for 1955–56 is 17 per cent. In addition, she found that about one-half of the people (8 per cent of all employed persons) who worked part time during 1949–56 were not available for full-time work. There may also be an increasing trend in this series, because the average for 1955–56 (8.4 per cent) is greater than the average for 1949–56 (8 per cent). Estimates prepared by the Bureau of Labor Statistics tend to confirm Mrs. Bancroft's results. Generally, the BLS estimates some increase in part-time work by 1970–75. In particular, it estimates that approximately 20.5 per cent of employed persons in 1970 will work less than 35 hours per week. The corresponding estimate for 1975 is 20.7 per cent.[21]

In 1955, 7.8 million persons worked from 15 to 34 hours per week, and an additional 2.6 millions worked from 1 to 14 hours. Assuming that the people employed from 15 to 34 hours per week worked an average of 25 hours, and that those employed from 1 to 14 hours worked an average of 8 hours, part-time workers averaged 21 hours per week.

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[20] Bancroft, *op. cit.*, p. 92.

[21] "Population and Labor Force Projections for the United States, 1960 to 1975," *loc. cit.*, p. 55.

On the basis of these figures, assuming that the ratio of people available for less than full-time work is the same among unemployed as among employed persons, part-time employees will represent 10 per cent of the labor force in 1970 and 1975, and they will desire to work 20 hours per week on the average. Consequently, a reduction of the labor-force projections by 5 per cent gives an estimate of the full-time equivalent laborers available in 1970 and 1975. The range for 1970 is 82,737,000 to 82,919,000 and for 1975 from 90,036,000 to 90,899,000.

While these estimates allow us to forecast the magnitude of unemployment, they do not give unemployment statistics that are comparable to those published by the Department of Labor. Our figures count the person who is underemployed, in the sense that he would like to work more hours, as partially employed and partially unemployed. In order to make the series comparable, we assume in Section 6 that 5 per cent of the full-time jobs available will be filled by part-time workers. This has the effect of increasing the number of positions available from 64.8 millions to 68.0 millions in 1970 and from 68.9 millions to 72.3 millions in 1975. Assuming that entreprenurial employment will be 8.0 millions in each year, we obtained the unemployment statistics presented in Section 6.

3. FORECASTING ECONOMIC MAGNITUDES

a. *Introduction*

Forecasting aggregate employment has occupied an important role in quantitative economics since the end of World War II. In the immediate postwar period, there were many attempts to estimate future employment by the simple method of projecting a fitted, linear consumption function to the target date. More particularly, the following procedure was usually adopted. The forecaster first estimated full-employment gross national product for the year or years in question. This estimate of aggregate supply was generally based on considerations of population and labor-force growth, of productivity increases, and of changes in the length of the workweek. To estimate aggregate demand, the investigator normally studied government expenditure, consumer spending, and private business investment. By applying the method of least squares to a set of observations from the prewar period, a consumption function was estimated.

The statistically determined marginal propensity to consume was generally very low. This led many economists to predict that, with the expected growth in output potential, a wide gap would exist between the purchasing power actually used for consumption and the full-employment level of consumer-goods production. Estimates of the investment function did not lead the forecasters to believe that private business investment would fill this gap. Furthermore, unless government policies were specifically designed for the purpose, there was no indication that government expenditures or tax decreases would insure full employment. Hence, these writers predicted that full employment in the postwar years would be contingent upon planned government action.[22]

The estimates of employment were, in short, very pessimistic. Much too pessimistic, in fact, since the immediate postwar period proved to be one of relatively full employment. There were many reasons for the lack of success in prediction, a very notable one being that the prewar data did not apply to postwar conditions, i.e., there was a change in the statistical universe relevant to the problem at hand. The failure of these predictions, however, did point out the difficulties incident to intermediate and long-range economic forecasting.

b. *Methodology*

It is precisely with such long-range forecasts, nonetheless, that this study is concerned. Briefly, output and employment for 1970 and 1975 are estimated and compared with the labor-force projections for the terminal years in question. Our predictions, just as the immediate postwar predictions, are rather pessimistic. But they are based upon a careful study of fairly recent trends. The conclusion is that unless these trends are reversed, or unless there is a significant change in public policy, a much larger volume of unemployment must be expected in the future.

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[22] See, for example, Arthur Smithies, "Forecasting Postwar Demand: I," *Econometrica,* 13 (1945), pp. 1–14; J. L. Mosak, "Forecasting Postwar Demand: III," *Econometrica,* 13 (1945), pp. 25–53; and L. R. Klein, "Post-Mortem on Transition Predictions of National Product," *Journal of Political Economy,* 54 (1946), pp. 298–308.

Before turning to the estimates themselves, however, it seems desirable to explain our general approach to the problem of forecasting employment. To begin with, the predictions are based almost exclusively upon least-squares projections of time-series data.[23] This is, of course, a very risky business, especially when the period of forecast is relatively long. In any event, the use of time-series data entails the assumption that recently observed trends continue unchanged into the future. As is common in time-series projections, we make forecasts for "typical" years, not for cyclical peaks or troughs. We have consequently eliminated especially high and low values from many of the time series. Furthermore, since the statistical fit is influenced by all observations, the choice of terminal years does not materially influence the estimates.

The most notable feature of the estimation process is a rather extensive disaggregation of the economy. Using the National Income Division industrial classification, the economy was divided into sixty-two sectors. We then estimated the contribution to national income (i.e., value added) in current dollars and the average net output of production workers in current dollars for each sector for the terminal years 1970 and 1975. Finally, by dividing the estimated income per sector by the estimated output per worker in that sector, we obtained an estimate of employment in each sector. Aggregating the sixty-two industries then gave an estimate for aggregate employment for the years in question.

It is to be expected that estimates based upon such a disaggregation are "better" than estimates based upon simple projections of aggregate national income and aggregate dollar output per worker. In the first place, there has been a significant shift in the composition of aggregate demand in the postwar era. Shifts in demand alone may have a substantial effect upon employment. For example, a change in composition in favor of relatively capital-intensive goods would cause employment to decrease. And it would decrease even though the level of aggregate demand remained unchanged.

Secondly, average output per worker changes at different rates in the various sectors of the economy. We have made no effort to distinguish between productivity increases attributable to technological change and those attributable to an increase in the quantity of co-operating factors, technology remaining unchanged. Indeed, some economists have argued that a distinction between these two forces is impossible. Nonetheless, the average contribution to sector income does change, and it changes at different rates among the sectors. There is consequently a predictable effect upon the demand for labor. For example, if the average output per worker increases more rapidly than demand, there will be a decline in employment. Such a relationship is typified by several manufacturing industries in our estimates. For instance, in the "Machinery, except Electrical" industry, we predict a growth of average income contribution per worker of about 3.50 per cent per annum, while the corresponding rate for demand is 2.77 per cent per annum. If these or similar rates do in fact obtain, there will inevitably be a decline in employment in the industry.

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[23] As subsequently explained, some estimates were made by fitting Pearl-Reed curves, while still others were fitted by inspection.

Thus allowing for changes in the composition of demand and for differential changes in the average dollar output of labor should improve employment forecasts materially. Making our forecasts on the basis of disaggregation, however, involves two crucial assumptions. In the first place, we must assume that a viable input-output relationship is maintained among the various sectors of the economy. We know, of course, that the historically observed input-output relationships were viable. But this does not necessarily imply that when, the recently observed changes in the composition of output are projected to 1970 and 1975, the economy will still be viable. This remains an assumption.

Secondly, income earning and spending are relegated to the background. Ignoring the source, we assume that the recent trend in demand continues into the future. Dollar demand for each industry in 1970 and 1975 is predicted; and in making these predictions, we do not rely upon associated predictions of income earnings and of consumption and investment functions. Instead, we merely project the recent trend in each sector, assuming that monetary demand is forthcoming from some source. To the extent that we forecast higher average levels of unemployment in the economy, this assumption may appear to be rather optimistic and unwarranted. However, we expected that governmental policy will be adjusted so as to maintain, at least roughly, the current rate of growth of national output.[24]

c. *Definitions*

In making our demand projections, National Income Division data on "National Income by Industry" are used. We are thus concerned with national income in current dollars, rather than with gross national product. All of our estimates for future sector demand are expressed in non-deflated dollar magnitudes.

The average output estimates are similar. They are based upon the number of full-time equivalent employees per industry, and they are obtained by dividing national income per sector by the number of workers. The resulting figure is the current dollar value of national income originating in the sector in question *per full-time equivalent employee in that sector.* We shall generally call this "average output per worker," although other designations would serve just as well. It should be clear, however, that average output per worker is closely related to, but certainly not identical with, what might be called the average productivity of labor.

4. FORECASTS OF SECTOR DEMAND AND NATIONAL INCOME

a. *Estimation of Sectoral Demand*

Statistical material relating to the sector demand projections is contained in Table 11. Of the sixty-two industry estimates, some fifty-three were made by the method of least squares, most of them covering the years 1947–59. Pearl-Reed curves were fitted to the data for five sectors, and four sectors were so irregular that inspection estimates were made for them. The estimating equation for each industry is shown in column 3, while columns 4 and 5 show the correlation coefficient and the standard error of the regression coefficient respectively. Columns 5 and 6 list the magnitudes of the

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[24] One additional assumption is required by the use of current dollar magnitudes. In particular, we must assume that future differential price changes will follow the pattern observed in the sample period. If adequate price indexes had been available, the data could have been deflated, obviating this assumption. However, since most prices are at least partially sensitive to conditions of excess demand or supply, and since our projections rely upon changing demand composition, this assumption does not seem to be particularly objectionable.

Table 11. The Estimation of Sectoral Demand

Industry	Method & years[1]	Estimating equation	Correlation coefficient	$(s_b)^2$	Point SE for 1970[3]	Point SE for 1975	Pct. error in est. for 1960[4]
Farms	Est. Constant	16000.00	N/A	N/A	Assumed 800	Assumed 1600	0.7
Agri. svces., forestry, & fishing	L.S. 1947–59	$755.69 + 46.17t$	.9954	1.33	23.22	29.77	3.9
Metal mining	P.R. (MA) 1947–59	$1111.18/1+e^{0.13578 - 0.22725t}$	N/A	N/A	92.69	93.72	20.6
Anthracite mining	P.R. 1947–59	$1511.49/1+e^{1.49219 + 0.11617t}$	N/A	N/A	3.62	2.43	7.6
Bituminous & other soft coal mining	L.S. (M.A.) 1948–57	$1533.0-22.85t$	.9298	3.20	100.85	132.41	2.6
Crude petroleum & natural gas	L.S. (Log Y) 1949–54, 57–60	$3.34 + .01t$	.9427	.001	.04	.05	9.5
Nonmetallic mining & quarrying	L.S. (Log Y) 1951–55, 57–60	$2.85 + .01t$	.9532	.001	.07	.09	1.2
Contract construction	L.S. 1947–59	$15431.54 + 1057.02t$	.9895	46.50	809.38	1037.64	1.5
Food & kindred products	L.S. 1947–59	$7868.23 + 322.93t$	.9868	16.44	286.19	366.90	0.1
Tobacco mfrs.	L.S. 1947–59	$642.15 + 45.62t$	.9824	2.61	45.48	58.30	5.3
Textile mill prod.	Mean of Series	4453.50	Use Standard Deviation of Series:		82.11		3.6
Apparel & other finished fabric prod.	L.S. 1947–59	$3943.77 + 111.00t$	.9524	10.71	186.50	239.10	3.2
Lumber & furniture prod.	L.S. 1947–59	$4431.15 + 124.10t$	.8113	26.97	469.45	601.84	4.6
Paper & allied prod.	L.S. 1947–59	$3273.00 + 183.29t$	.9608	15.94	277.49	355.75	0.6
Printing, publ., & allied ind.	L.S. 1947–59	$4506.77 + 263.46t$	.9941	8.64	150.45	192.88	3.2
Chemicals & allied prod.	L.S. 1947–59	$6359.23 + 427.64t$	.9808	25.77	448.59	575.09	2.1
Prod. of petroleum & coal	L.S. 1948–60	$3716.62 + 96.83t$	.7779	23.59	387.60	503.16	2.3
Rubber prod.	L.S. 1947–59	$1542.31 + 87.80t$	.8850	13.92	242.36	310.71	0.3
Leather & leather prod.	L.S. 1951–59	$1390.33 + 21.13t$	.7951	6.09	92.73	122.86	4.0
Stone, clay, & glass prod.	L.S. 1947–59	$3144.38 + 206.88t$	.9690	15.91	276.89	354.98	3.7
Metals, metal prod., & misc.	P.R. (M.A.) 1947–59	$27092.25/1+e^{-0.07948 - 0.2264t}$	N/A	N/A	31.85	33.38	0.2
Machinery, exc. electrical	P.R. (M.A.) 1947–59	$18047.61/1+e^{0.76351 - 0.1435t}$	N/A	N/A	128.62	154.50	11.3
Electrical mach.	L.S. 1947–59	$6151.85 + 493.69t$	.9683	38.42	668.79	857.40	5.2
Transp. equip., exc. automobiles	P.R. 1947–59	$8673.71/1+e^{0.46515 - 0.37567t}$	N/A	N/A	17.80	17.80	22.6
Automobiles & automobile equip.	L.S. 1947–60 omit 55 & 58	$6490.67 + 167.90t$	.8967	26.21	916.78	1173.20	3.4
Wholesale trade	L.S. 1947–59	$16994.08 + 955.25t$	.9836	52.88	920.41	1179.98	0.8
Retail trade & automobile svces.	L.S. 1947–59	$33665.31 + 1314.27t$	.9895	57.75	1005.30	1288.82	4.4
Banking	L.S. 1947–59	$4105.62 + 355.60t$	.9936	12.17	211.83	271.58	9.0
Security & commodity brokers, dealers, & exch.	L.S. 1947–60 omit 49, 52, 53, 56, 57	$445.33 + 50.16t$	.9956	1.78	30.29	38.91	1.8
Finance, n.e.c.	L.S. 1947–59	$657.77 + 53.57t$	.9578	4.85	84.41	108.22	8.7
Insurance carriers	L.S. 1948–60 omit 49, 56, 57	$3280.10 + 245.90t$	.6361	9.33	153.45	199.14	2.5
Insurance agents & combination offices	L.S. 1947–59	$1552.54 + 126.29t$	.9974	2.77	48.15	61.73	0.5
Real estate	L.S. 1947–59	$17759.77 + 1187.97t$	.9969	28.36	493.62	632.82	0.9
Railroads	S.L. By Inspection	$7800.00 - 53.00t$	Use Standard Deviation of Series:		532.73		7.9
Local & highway pass. transp.	L.S. (M.A.) 1945–57	$1400.69 + 9.46t$	.9568	.81	15.61	19.58	3.5
Highway freight transp. & warehousing	L.S. 1947–59	$3684.46 + 290.21t$	.9952	8.59	149.59	191.78	0.02
Water transp.	L.S. (M.A.) 1947–57	$907.40 + 23.20t$	.9583	2.31	42.14	53.53	4.2
Air transp.	L.S. 1947–59	$663.31 + 73.21t$	.9962	1.93	33.61	43.08	7.2
Pipeline transp.	L.S. 1947–52, 56–60	$272.45 + 12.39t$	.9161	1.81	31.16	39.96	3.8
Services allied to transp.	L.S. 1947–59	$809.08 + 44.90t$	.9710	3.33	58.00	74.36	5.4
Telephone, telegraph, & related svces.	L.S. 1947–59	$4157.62 + 368.56t$	.9976	7.72	134.40	172.31	4.2
Radio broadcasting & television	L.S. 1947–59	$498.31 + 52.04t$	.9927	1.91	33.31	42.70	3.8
Utilities: electric & gas	L.S. 1947–59	$5177.31 + 410.21t$	.9981	7.72	134.30	172.18	5.3
Local utilities & public svces., n.e.c.	L.S. 1947–59	$169.92 + 11.21t$	.9827	.64	11.15	14.29	3.1
Hotels & other lodging places	L.S. 1947–59	$1570.46 + 51.32t$	.9887	2.35	40.92	52.46	5.6
Personal svces.	L.S. 1947–59	$3441.62 + 140.48t$	.9937	4.77	82.93	106.39	6.5
Private households	L.S. 1947–59	$6034.77 + 516.56t$	.9923	19.44	338.43	433.87	6.3
Commercial & trade schools & employment agencies	L.S. 1947–59	$177.54 + 9.48t$	.9504	.94	16.28	20.87	5.1
Business svces., n.e.c.	L.S. 1949–60	$3670.25 + 189.89t$	.9958	27.06	271.79	355.80	5.4
Misc. repair svces. & hand trades	L.S. 1949–60 omit 54, 58	$1287.60 + 82.38t$	.9956	2.74	44.46	57.91	3.0
Motion pictures	Mean of Series	856.38	Use Standard Deviation of Series:		40.45		3.0
Amusement & recreation, exc. motion pictures	L.S. 1947–59	$1071.54 + 63.96t$	.9703	4.81	83.67	107.27	9.6
Medical & other health svces.	L.S. 1948–60	$6748.77 + 570.53t$	.9778	36.85	605.51	786.04	7.5
Legal svces.	L.S. 1948–60	$1820.38 + 128.09t$	.9754	8.72	143.34	186.07	8.4
Engineering & other prof. svces., n.e.c.	L.S. 1947–59	$1283.08 + 141.65t$	.9870	6.95	121.06	155.20	2.7
Educational svces., n.e.c.	L.S. (log Y) 1947–60	$3.16 + 0.02t$	.9962	.0004	.016	.02	5.0
Non-profit membership org., n.e.c.	L.S. 1947–59	$2098.85 + 159.28t$	.9903	6.74	117.37	150.47	8.8
Federal general govt.	L.S. 1948–60	$16935.62 + 983.92t$	.8943	148.43	2570.85	3166.08	5.7
Federal govt. enterprises	L.S. 1947–59	$2338.85 + 142.54t$	.9866	7.11	123.81	158.73	5.4
State & local general govt.	L.S. (log Y) 1947–60	$4.1445 + 0.0203t$	.9992	.0002	.0081	.0104	0.5
State & local govt. enterprises	L.S. 1947–59	$1078.69 + 85.66t$	.9914	3.41	59.28	76.00	0.7
Rest of the world	L.S. 1947–59	$1536.85 + 121.77t$	.9732	8.67	150.90	193.46	4.8

[1] L.S. = least squares estimate
P.R. = Pearl-Reed curve
M.A. = curve fitted to moving-average of data
S.L. = straight line
log Y = curve fitted to logarithm of original data

[2] $s_b = \sqrt{\frac{\sigma^2}{\Sigma(t - \bar{t})^2}}$, where $\sigma^2 = \left[\Sigma(Y - \bar{Y})^2 - \frac{\Sigma(Y - \bar{Y})(t - \bar{t})}{\Sigma(t - \bar{t})^2}\right] \div N - 2$ and

t = time in years.

[3] The standard error of a point estimate of future values is determined by the following formula:

$\sigma\sqrt{\frac{1}{N} + \frac{(T - \bar{t})^2}{\Sigma(t - \bar{t})^2}}$, where T is the year for which the point estimate is made.

[4] Ignoring sign, computed as

$$\frac{Y_{1960} - Y^E_{1960}}{1960}$$

standard errors of the specific estimates for 1970 and 1975. Finally, column 7 shows the percentage error between the actual value for 1960 and the value obtained from the estimating equation. Except for some of the Pearl-Reed estimates, these percentage errors are quite small.

Similarly, except for the sectors in which a Pearl-Reed curve is used, the estimating equations pass the so-called naïve test. That is, the 1960 estimates based on the estimating equation are more nearly correct than the simple estimate that demand remains constant in each sector. The naïve test is, of course, a very weak one; but in a sense, it is also a primary one. While a great deal of importance should not be attached to this test, it is certainly one that "should" be passed by a system of estimating equations.

The Pearl-Reed estimates, on the other hand, do not generally yield close predictions for 1960. These modified logistic curves fit the data rather well, so one may reasonably expect the asymptotic predictions to be fairly accurate. The use of Pearl-Reed curves was necessary for two reasons. In a few declining sectors, such as Anthracite Mining, a Pearl-Reed curve was about the only fitted curve that would not predict a *negative* sector national income contribution when extended to 1970 and 1975. In other cases, a Pearl-Reed curve was fitted to the time-series data for sectors that experienced rapid growth in the immediate postwar years but modest growth subsequently. "Machinery, except Electrical" is a good example of an industry in this category.

b. *Aggregate Projections*

The dollar estimates shown in Table 12 may be aggregated to yield our predictions of national income in 1970 and 1975. In total, we predict an increase in current-dollar national income from about $400 billion in 1959 to $594 billion in 1970 and $702 billion in 1975. This represents a growth of $194 billion over the 1959–70 period, or an increase of some 48.5 per cent. Expressed as a growth rate, the predictions imply a 3.66 per cent per annum increase over the eleven-year interval from 1959 to 1970. This is almost identical to the predictions that would be made if a simple least-squares line were fitted to the time-series data for aggregate national income. The prediction for 1970 would be $591 billion, a difference of about one-half of one per cent. The changing composition of demand thus appears to have relatively little influence upon the magnitude of the aggregate

Table 12. Estimates of National Income Ranges, by Sector, 1970 and 1975
(*in millions of current dollars*)

Industry	Income 1970			Income 1975		
	Low	Medium	High	Low	Medium	High
Farms	15200.00	16000.00	16800.00	14400.00	16000.00	17600.00
Agric. svces., forestry, & fishing	1489.40	1540.59	1591.68	1705.94	1771.44	1836.94
Metal mining	1010.82	1105.25	1197.94	1014.91	1109.28	1203.00
Anthracite mining	30.81	32.57	37.19	17.58	18.40	20.83
Bituminous & other soft coal mining	501.34	733.30	965.26	200.27	504.81	809.35
Crude petroleum & natural gas	3487.70	4225.80	5119.90	4052.70	5208.10	6692.80
Nonmetallic mining & quarrying	1039.00	1290.00	1406.80	1181.00	1448.50	1772.50
Contract construction	31620.18	33400.82	35181.46	36403.09	38685.90	40968.71
Food & kindred prod.	12898.49	13528.11	14157.73	14385.60	15192.78	15999.96
Tobacco mfrs.	1317.65	1417.71	1517.77	1517.53	1645.81	1774.09
Textile mill prod.	4292.56	4453.50	4614.44	4292.56	4453.50	4614.44
Apparel & other finished fabric prod.	5420.47	5830.77	6241.07	5859.75	6385.77	6911.79
Lumber & furniture prod.	5508.14	6540.93	7573.72	5837.40	7161.45	8485.50
Paper & allied prod.	5778.37	6388.86	6999.35	6522.63	7305.29	8087.95
Printing, publ., & allied ind.	8654.61	8985.61	9316.61	9878.57	10302.92	10727.27
Chemicals & allied prod.	12642.27	13629.16	14616.05	14502.17	15767.37	17032.57
Prod. of petroleum & coal	4413.17	5265.89	6118.61	4643.09	5750.04	6856.99
Rubber prod.	2501.75	3034.95	3568.15	2790.39	3473.96	4157.53
Leather & leather prod.	1488.49	1707.33	1926.17	1523.06	1813.00	2102.94
Stone, clay & glass prod.	6052.17	6661.33	7270.49	6914.76	7695.72	8476.68
Metals, metal prod., & misc.	26846.38	26878.57	26910.42	26989.56	27022.94	27056.32
Machinery, exc. electrical	16760.54	16890.13	17018.75	17329.05	17463.63	17598.13
Electrical machinery	13073.18	14544.52	16015.86	15126.68	17012.96	18899.24
Transp. equip., exc. automobiles	8644.95	8662.25	8680.54	8654.20	8672.03	8689.86
Automobiles & automobile equipment	10158.97	12199.37	14243.77	11262.16	13878.37	16494.58
Wholesale trade	31208.46	33233.37	35258.20	35413.67	38009.64	40605.61
Retail trade & automobile svces.	53796.21	56007.88	58219.50	59743.84	62579.23	65414.62
Banking	9684.85	10150.89	10616.93	11331.44	11928.91	12526.18
Security & commodity brokers, dealers & exch.	1198.75	1270.23	1341.71	1429.22	1521.05	1612.88
Finance, n.e.c.	1382.68	1568.39	1754.10	1598.14	1836.22	2074.30

Table 12. Estimates of National Income Ranges, by Sector, 1970 and 1975 (*continued*)
(*in millions of current dollars*)

Insurance carriers	6052.85	7214.54	8376.23	6938.16	8444.06	9949.96
Insurance agents & combination offices	3593.56	3699.49	3805.42	4195.14	4330.94	4466.74
Real estate	36869.34	37955.30	39041.26	42502.95	43895.16	45287.37
Railroads	5567.99	6740.00	7912.01	5302.99	6475.00	7647.01
Local & highway pass. transp.	1546.14	1580.48	1614.82	1584.71	1627.79	1670.87
Highway freight transp. & warehousing	8289.00	8618.10	8947.20	9647.27	10069.18	10491.09
Water transp.	1229.71	1324.94	1420.17	1319.95	1440.92	1561.89
Air transp.	1833.93	1907.86	1981.79	2179.12	2273.90	2368.68
Pipeline transp.	408.17	478.60	549.03	450.25	540.55	630.85
Services allied to transp.	1444.80	1572.40	1700.00	1633.31	1796.90	1960.49
Telephone, telegraph & related svces.	10127.46	10423.14	10718.82	11886.87	12265.94	12645.01
Radio broadcasting & television	1309.68	1382.96	1456.24	1549.20	1643.15	1737.10
Utilities: electric & gas	11855.46	12150.95	12446.44	13823.22	14202.02	14580.80
Local utilities & public svces., n.e.c.	335.95	360.47	384.99	385.08	416.52	447.96
Hotels & other lodging places	2352.95	2442.97	2532.99	2584.18	2699.59	2815.00
Personal svces.	5647.30	5829.74	6012.18	6298.06	6532.13	6766.20
Commercial & trade schools & employment agencies	302.95	338.76	374.57	340.27	386.18	432.09
Business svces., n.e.c.	8950.75	9556.84	10162.93	10662.30	11455.74	12249.18
Misc. repair svces. & hand trades	2478.02	2589.27	2691.52	2868.20	3001.49	3134.69
Private households	14071.76	14816.30	15560.84	16444.59	17399.10	18353.61
Motion pictures	766.18	856.38	946.58	766.18	856.38	946.58
Amusement & recreation, exc. motion pictures	1974.71	2158.79	2342.87	2242.58	2478.57	2714.56
Medical & other health svces.	14545.18	15877.30	16209.42	17000.67	18729.96	20459.25
Legal svces.	3554.45	3869.79	4185.13	3460.44	3869.79	4279.14
Engineering & other prof. svces., n.e.c.	3424.85	3691.19	3957.53	4058.01	4399.46	4740.91
Educational svces., n.e.c.	5596.00	6071.20	6588.00	8433.00	9367.50	10405.00
Non-profit membership org., n.e.c.	4548.39	4806.61	5064.83	5271.97	5603.01	5934.05
Federal general govt.	27019.85	32678.30	38336.74	30629.34	37597.86	44556.43
Federal govt. enterprises	4489.70	4762.09	5034.48	5125.60	5474.81	5824.02
State & local general govt.	62537.54	65091.94	67750.78	98501.36	103819.05	109312.75
State & local govt. enterprises	2404.57	2534.99	2665.41	2796.13	2963.32	3130.51
Rest of the world	3275.04	3607.02	3939.00	3790.26	4215.67	4641.48

change. However, as we shall later see, it does have a significant effect upon the predicted volume of employment.

One must place considerably less reliability in the 1975 estimate. However, it is not qualitatively different from the 1970 estimate. In this case, the predicted sixteen-year increase in national income is $302 billion, or 75.5 per cent. The associated rate of growth is 3.57 per cent per annum, only slightly less than the predicted rate over the shorter time period. While both of these rates are somewhat larger than the reported average rate of growth since World War II, it must be remembered that we used national income in *current dollars.* The predicted rates of growth are, therefore, necessarily greater because the estimates include the effects of the inflationary movements during the postwar years.

c. *Sector Estimates*

The specific sector estimates for 1970 and 1975 are shown in Table 12. The first block of three columns refers to 1970, while the second block of three gives the figures for 1975. The middle column in each block, headed "Medium," contains the actual predictions derived from the estimating equations. The columns labeled "Low" and "High" give a range for the estimated value which, in effect, constitutes a 95 per cent confidence interval for each sector estimate. For example, the "High" estimate for any industry in 1970 is obtained by adding an appropriate multiple of the point-estimate standard error for 1970 to the value in the "Medium" column. The multiple in question is the value of the *t*-statistic for the appropriate degrees of freedom at the 5 per cent level. In the discussion that follows, all remarks refer to the "Medium" values unless otherwise stated.

As already noted, the prediction of aggregate national income shows an annual rate of growth of 3.66 per cent. The various sector estimates differ quite widely, however. In the first instance, a decline is predicted in the dollar value of national income originating in four industries: Anthracite Mining, Bituminous and Other Soft Coal Mining, Textile Mill Products, and Railroads. In addition to this, the constant level "inspection estimate" for Farms is slightly below the recorded 1959 value for national income originating in the Farm industry.

The remaining fifty-seven industries are predicted to grow at rates ranging from 0.28 per cent per annum in the Motion Picture industry to 9.79 per cent per annum in the State and Local General Government sector. The projected behavior is shown more precisely in Table 13. The first column lists those industries for which a decline is predicted. The second column shows those industries that are expected to grow more slowly than the national average. This category contains twenty industries whose projected rate of growth is less than 3.33 per cent per annum. Column 3 lists the fifteen industries that are predicted to grow at roughly the national average rate, at rates, that is, between 3.33 and 3.99 per cent per annum. Finally, the fourth column shows those industries that are expected to grow more rapidly than the national average. This classification contains the twenty-two industries whose projected rates of annual growth are 4 per cent or greater.

To obtain a broader view of the income projections, it is helpful to consider blocks of industries in a wider classificatory scheme. The declining industries include three from Agricultural and Extractive Industries, and one each from Manufacturing and from Transportation. The declining segment is thus heavily concentrated in those sectors dealing with products of the soil.

The industries growing more slowly than the national average are heavily concentrated in Manufacturing (9) and Service Trades and Recreation (5). The remainder come from Trade and Finance (3), Transportation (2), and Agricultural and Extractive Industries (1). This is, more or less, what one would expect in a growing economy; as national income increases, it is reasonable to suppose that there will be some general shift from *goods* of all kinds to *services.*

The industries that are expected to grow at the national average are concentrated in Manufacturing, with small numbers from six other broad classification groups. There are seven manufacturing industries listed, although five of these had rates less than the 3.66 per cent per annum national average. Finally, the rapidly growing industries are concentrated in the *service* area: Utilities, Professional Services, and Government.

In concluding our discussion of income estimates, let us consider the projections of national income originating in both Federal and State and Local General Governments. The projected rate of growth for the Federal Government is 4.17 per cent per annum, only one-half of one per cent greater than the projected national average rate. This seems to be a very modest rate of growth. But it is accounted

Table 13. Projected Growth by Sector

Declining Industries	Industries growing more slowly than national average	Industries growing at national average	Industries growing more rapidly than national average
Farms	Nonmetallic mining & quarrying	Agric. svces., forestry, & fishing	Metal mining
Anthracite mining	Food & kindred prod.	Tobacco mfrs.	Crude petroleum & natural gas
Bituminous & other soft coal mining	Apparel & other finished fabric prod.	Paper & allied prod.	Contract construction
Textile mill prod.	Lumber & furniture prod.	Printing, publ., & allied ind.	Banking
			Security & commodity brokers
Railroads	Prod. of petroleum & coal	Chemicals & allied prod.	Insurance carriers
	Rubber prod.	Stone, clay, & glass prod.	Insurance agents
	Leather & leather prod.	Electrical machinery	Highway freight transp.
	Metals, metal prod. & misc.	Automobiles & automobile equip.	Air transp.
	Machinery, exc. electrical	Real estate	Telephone, telegraph, & related svces.
	Transp. equip., exc. automobiles	Pipeline transp.	Radio broadcasting & television
	Wholesale trade	Services allied to transp.	Utilities: electric & gas
	Retail trade & automobile svces.		Local utilities & public svces., n.e.c.
	Finance, n.e.c.	Misc. repair svces. & hand trades	Private households
	Local & highway pass. transp.	Legal svces.	Business svces., n.e.c.
	Water transp.	Non-profit membership org., n.e.c.	Medical & other health svces.
	Hotels & other lodging places	Federal govt. enterprises	Engineering & other prof. svces., n.e.c.
	Personal svces.		Educational svces., n.e.c.
	Commercial & trade schools, employment agencies		Federal general govt.
	Motion pictures		State & local general govt.
	Amusement & recreation, exc. motion pictures		State & local govt. enterprises
			Rest of the world

for by the fact that the federal government's contribution to national income is composed almost exclusively of the salaries of civilian and military employees. The postwar trend has generally been a decline in employment in both components, accompanied by a slightly more than proportional increase in average remuneration. It does not seem unlikely that this trend, perhaps moderately abated, will continue, especially in light of recent developments in the field of military armaments and firepower. This does not, of course, imply that we are predicting only a slight increase in federal expenditures. The latter, for the most part, take either the form of purchases from other sectors or grants to other governmental units. Such expenditures enter into the national income contributions of the sectors concerned, but they do not augment national income originating in the Federal General Government. As a matter of fact, employment by the federal government is neither directly nor closely related to the level of its expenditures.

The most rapidly growing sector, according to our estimates, will be State and Local General Government. And it will also be the most important sector in 1970 and 1975, both from the standpoints of national income originating and of employment. The proximate "reason" for this prediction lies in the fact that the best fit was obtained by using a least-squares line through the logarithm of national income originating in this sector. The projection, therefore, is an exponential curve. More fundamentally, however, the postwar trend in State and Local Government expenditure *and* national income contribution has been steeply upward. This trend reflects the emphasis that has been placed upon education, as well as the expanded highway construction program and other public services of state and local governments.

With our continually expanding population, and especially with the increasing percentage concentrated in the school-age group, it is to be expected that the trend in State and Local General Government will continue. If the federal government should also undertake subsidies to education, as it now subsidizes highway construction, there may be an even more pronounced upward trend.

5. FORECASTS OF AVERAGE OUTPUT PER WORKER

a. *Estimation of Sectoral Average Output*

The average current dollar value of output per worker has been estimated in much the same fashion as national income by sector of origin. The relevant statistical details are presented in Table 14. The time-series data showing current dollar output per worker are considerably more well-behaved than the corresponding series for income originating in the various sectors. As a consequence, the estimates for all but two industries were made by fitting a least-squares line to the time-series data. And of the sixty fitted estimates, only two—Farms and Motion Pictures—were poor in the sense of yielding a relatively low coefficient of correlation. But in all cases the percentage error in the estimate for 1960 was negligible, and each estimate was superior to the naïve estimate for 1960.

b. *Sectoral Estimates*

The precise estimates for 1970 and 1975 are shown in Table 15, together with the "Low" and "High" estimates that constitute a 95 per cent confidence interval for the "Medium" estimate. The columns of Table 15 have precisely the same interpretation as do the corresponding columns of Table 12.

Our calculations, as well as mere empirical observation of the real economic world, have led us to predict an increase in the average current dollar value of output per worker in every sector of the economy. The associated projected rates of growth are not as variable as the projections for national income growth by sector. More precisely, the estimated rates of output-per-worker growth range from a low of 0.17 per cent per annum in Finance, n.e.c. to a high of 5.06 per cent per annum in the Rest of the World. But when the inspection estimates and the Rest of the World are omitted, the effective range is from 1.04 per cent per annum in Miscellaneous Repair Services and Hand Trades to 4.51 per cent per annum in both Private Households and Security and Commodity Brokers, Dealers, and Exchanges.

The growth rate data for both national income by sector of origin and dollar value of output per worker are shown in greater detail in

Table 14. The Estimation of Average Current Dollar Value of Output Per Worker by Sector [1]

Industry	Method & years	Estimating equation [2]	Correlation coefficient	s_b	Point SE for 1970	Point SE for 1975
Farms	L.S. 1950–60	$2017.36 + 37.40t$	.6530	14.46	221.62	249.98
Agric. svces., forestry, & fishing	L.S. 1947–59	$5241.15 + 232.59t$	.9957	6.49	112.99	144.85
Metal mining	L.S. 1947–59	$3.61 + 0.16t$	.8705	.03	.46	.59
Anthracite mining	Inspection	Est. 3.95 for 1970 and 4.00 for 1975			Assume .40	Assume .60
Bituminous & other soft coal mining	L.S. 1947–59	$2.98 + 0.15t$	.9767	.01	.17	.22
Crude petroleum & natural gas	L.S. 1948–59	$3.69 + 0.04t$	.9039	.006	.20	.25
Non-metallic mining & quarrying	L.S. 1947–59	$2.70 + 0.12t$	.9754	.01	.14	.19
Contract construction	L.S. 1947–59	$3.13 + 0.15t$	.9968	.003	.06	.08
Food & kindred prod.	L.S. 1947–59	$3.44 + 0.20t$	.9923	.01	.13	.17
Tobacco mfrs.	L.S. 1947–59	$3.68 + 0.34t$	.9746	.02	.41	.53
Textile mill prod.	L.S. 1947–59	$2.16 + 0.05t$	.8556	.009	.15	.20
Apparel & other finished fabric prod.	L.S. 1947–59	$2.05 + 0.06t$	.9645	.005	.08	.10
Lumber & furniture prod.	L.S. 1947–59	$2.21 + 0.10t$	.9816	.006	.10	.13
Paper & allied prod.	L.S. 1947–59	$3.52 + 0.16t$	.9676	.01	.22	.29
Printing, publ., & allied ind.	L.S. 1947–59	$4.48 + 0.21t$	.9992	.002	.04	.06
Chemicals & allied prod.	L.S. 1947–59	$5.81 + 0.37t$	.9860	.02	.33	.43
Prod. of petroleum & coal	L.S. 1947–59	$10.10 + 0.56t$	.9453	.06	1.02	1.31
Rubber prod.	L.S. 1947–59	$3.74 + 0.22t$	.9476	.02	.39	.50
Leather & leather prod.	L.S. 1947–59	$2.05 + 0.07t$	.9383	.007	.13	.17
Stone, clay, & glass prod.	L.S. 1947–59	$3.44 + 0.23t$	.9957	.006	.11	.14
Metals, metal prod., & misc.	L.S. 1947–59	$2.94 + 0.15t$	.9727	.01	.18	.23
Machinery, exc. electrical	L.S. 1947–59	$3.96 + 0.23t$	.9930	.01	.14	.18
Electrical machinery	L.S. 1947–59	$3.87 + 0.24t$	.9740	.02	.29	.38
Transp. equip., exc. automobiles	L.S. 1947–59	$3.77 + 0.29t$	.9900	.01	.21	.28
Automobiles & automobile Equip.	L.S. 1947–59	$4.94 + 0.28t$	.9539	.03	.46	.59
Wholesale trade	L.S. 1947–59	$3.08 + 0.12t$	.9806	.007	.13	.16
Retail trade & automobile svces.	L.S. 1947–59	$2.43 + 0.07t$	.9869	.003	.06	.07
Banking	L.S. 1947–59	$7976.0 + 378.68t$	.9849	20.05	348.96	447.37
Security & commodity brokers, dealers & exch.	L.S. 1947–59	$6014.77 + 436.26t$	.9168	57.29	997.26	1278.50
Finance, n.e.c.	Mean of Series	4163.73	Use Standard Deviation of Series:		270.55	
Insurance carriers	L.S. 1947–59 omit 49, 55–57	$4227.78 + 196.59t$	.9294	29.50	492.24	638.09
Insurance agents & combination offices	L.S. 1947–59	$791.69 + 365.03t$	.9909	14.93	259.86	333.15

Table 14. The Estimation of Average Current Dollar Value of Output Per Worker by Sector[1] (*continued*)

Real estate	L.S. 1947–59	37547.08 + 2112.07t	.9855	109.71	1909.74	2448.32
Railroads	L.S. 1947–59	5727.69 + 244.38t	.9683	19.02	331.09	424.46
Local & highway pass. transp.	L.S. 1947–59	4289.85 + 149.82t	.9934	5.20	90.57	116.11
Highway freight transp. & warehousing	L.S. 1947–59	5812.92 + 220.43t	.9922	8.35	145.32	186.30
Water transp.	L.S. 1947–59	6730.92 + 256.10t	.9205	32.78	570.56	731.46
Air transp.	L.S. 1947–59	5893.85 + 312.76t	.8951	46.97	817.52	1048.08
Pipeline transp.	L.S. 1950–59	11151.90 + 198.32t	.9707	17.36	547.21	718.57
Svces. allied to transp.	L.S. 1947–59	4470.54 + 229.29t	.9938	7.71	134.17	172.01
Telephone, telegraph, & related svces.	L.S. 1947–59	5630.62 + 425.71t	.9908	17.56	305.71	391.92
Radio broadcasting & television	L.S. 1947–59	7572.23 + 430.92t	.9855	22.35	389.05	498.77
Utilities: electric & gas	L.S. 1947–59	9318.14 + 609.71t	.9963	16.70	291.18	373.04
Local utilities & public svces., n.e.c.	L.S. 1947–59 omit 1954	6854.40 + 392.83t	.9912	16.62	289.76	371.22
Hotels & other lodging places	L.S. 1947–59	3344.31 + 79.64t	.9914	3.17	55.12	70.67
Personal svces.	L.S. 1947–59	4066.54 + 163.92t	.9956	4.67	81.30	104.23
Private households	L.S. 1947–59	3846.46 + 329.26t	.9938	11.12	193.51	248.09
Commercial & trade schools & employment agencies	L.S. 1947–59	4696.69 + 146.90t	.9767	9.72	169.27	217.01
Business svces., n.e.c.	L.S. 1947–59	4650.08 + 276.93t	.9893	12.31	214.36	274.81
Misc. repair svces. & hand trades	L.S. 1947–59	8782.92 + 100.84t	.8443	19.30	335.94	430.68
Motion pictures	L.S. 1947–59	4268.62 + 65.05t	.6566	22.53	392.15	502.74
Amusement & recreation, exc. motion pictures	L.S. 1947–59	4447.62 + 247.90t	.9797	15.28	266.03	341.05
Medical & other health svces.	L.S. 1947–59	5440.08 + 138.82t	.9601	12.20	212.41	272.32
Legal svces.	L.S. 1947–59	13791.46 + 540.99t	.9831	30.42	529.46	678.77
Engineering & other prof. svces., n.e.c.	L.S. 1947–59	7690.62 + 266.44t	.9970	6.29	109.43	140.29
Educational svces., n.e.c.	L.S. 1947–59	3266.62 + 148.58t	.9985	2.48	43.11	55.27
Non-profit membership org., n.e.c.	L.S. 1947–59	3215.54 + 150.55t	.9986	2.37	41.21	52.84
Federal general govt.	—[3]	—[3]				
Federal govt. enterprises	L.S. 1947–59	4305.23 + 216.25t	.9922	8.20	142.75	183.01
State & local general govt.	L.S. 1947–59	3497.46 + 183.08t	.9978	3.65	63.54	81.46
State & local govt. enterprises	L.S. 1947–59	3866.69 + 166.33t	.9977	3.40	59.16	75.84
Rest of the world	L.S. 1947–59	336815.38 + 35195.60t	.9372	394.83	6872.78	8811.01

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[1] For computational formulae, see Table 11.

[2] All industries are estimated on basis of output per man year except the twenty-five industries listed consecutively from "Metal Mining" through "Retail Trade and Automobile Services." The latter group was estimated using output per man hour.

[3] Separate estimates were made for the civilian and military components of the Federal General Government. Each estimate was made by the method of least squares for data covering the period 1947–59. *civilian:* 4233.31 + 217.88t ($r = 0.9915$). *military:* 3084.00 + 102.54t ($r = 0.9534$).

Table 15. Estimates of Average Current Dollar Value of Output per Worker by Sector, 1970 and 1975 (*current dollars*)

Industry	Output per Worker 1970			Output per Worker 1975		
	Low	Medium	High	Low	Medium	High
Farms	2077.50	2578.36	3079.22	2200.41	2765.36	3330.31
Agric. svces., forestry, & fishing	8946.58	9195.15	9443.72	10039.42	10358.09	10676.76
Metal mining	5.24 *	6.25	7.26	6.73	7.03	8.33
Anthracite mining	3.55 *	3.95	4.35	3.40	4.00	4.60
Bituminous & other soft coal mining	5.14 *	5.52	5.90	5.79	6.27	6.75
Crude petroleum & natural gas	4.54 *	4.98	5.42	4.80	5.37	5.94
Nonmetallic mining & quarrying	4.45 *	4.77	5.09	4.97	5.38	5.79
Contract construction	5.62 *	5.76	5.90	6.35	6.53	6.71
Food & kindred prod.	6.54 *	6.83	7.12	7.46	7.83	8.20
Tobacco mfrs.	8.54 *	9.44	10.34	9.99	11.14	12.99
Textile mill prod.	2.64 *	2.98	3.32	2.79	3.22	3.65
Apparel & other finished fabric prod.	2.82 *	2.99	3.16	3.05	3.27	3.49
Lumber & furniture prod.	3.68 *	3.90	4.12	4.12	4.40	4.68
Paper & allied prod.	5.79 *	6.28	6.77	6.46	7.09	7.72
Printing, publ., & allied ind.	7.94 *	8.04	8.14	8.96	9.08	9.20
Chemicals & allied prod.	11.44 *	12.17	12.90	13.10	14.04	14.98
Products of petroleum & coal	17.43 *	19.67	21.91	19.61	22.48	25.35
Rubber prod.	6.61 *	7.47	8.33	7.47	8.57	9.67
Leather & leather prod.	2.89 *	3.18	3.47	3.15	3.52	3.89
Stone, clay, & glass prod.	7.06 *	7.30	7.54	8.12	8.43	8.74
Metals, metal prod., & misc.	5.01 *	5.41	5.81	5.63	6.14	6.65
Machinery, exc. electrical	7.51 *	7.82	8.13	8.56	8.96	9.35
Electrical machinery	7.33 *	7.97	8.62	8.35	9.18	10.01
Transportation equip., exc. automobiles	8.20 *	8.67	9.14	9.50	10.11	10.72
Automobiles & automobile equip.	8.66 *	9.67	10.68	9.76	11.06	12.36
Wholesale trade	4.88 *	5.16	5.44	5.41	5.77	6.13
Retail trade & automobile svces.	3.44 *	3.56	3.68	3.73	3.89	4.05
Banking	13645.77	14413.49	15181.21	15322.65	16306.87	17291.09
Security & commodity brokers, dealers & exch.	11237.29	13431.25	15625.21	12799.88	15612.57	18425.26
Finance, n.e.c.	3560.40	4163.73	4767.06	3560.40	4163.73	4767.06
Insurance carriers	6078.00	7438.73	8799.46	6677.19	8421.67	10166.15

Table 15. Estimates of Average Current Dollar Value of Output per Worker by Sector, 1970 and 1975 (*current dollars*) (*continued*

Insurance agents & combination offices	13535.41	14107.16	14678.86	15199.37	15932.30	16665.23
Real estate	69250.86	73452.29	77653.72	78626.35	84012.65	89398.95
Railroads	9153.84	9882.23	10610.62	10170.34	11104.15	12037.96
Local & highway passenger trans.	6637.51	6836.76	7036.01	7330.42	7585.86	7841.30
Highway freight trans. & whsg.	9240.51	9560.21	9879.91	10252.50	10662.35	11072.20
Water trans.	9829.37	11084.60	12339.83	10755.88	12365.10	13974.32
Air trans.	9412.19	11210.74	13009.29	10468.76	12774.53	15080.30
Pipeline trans.	16041.17	17299.76	18558.35	17630.23	19282.94	20935.65
Services allied to trans.	8073.22	8368.40	8663.58	9136.39	9514.82	9893.25
Telephone, telegraph, & related svces.	12195.20	12867.76	13540.32	14134.10	14996.33	15858.56
Radio broadcasting & television	14041.92	14897.83	15753.74	15955.12	17052.42	18149.72
Utilities: electric and gas	19033.82	19683.16	20332.50	21899.82	22731.70	23563.58
Local utilities & pulic svces. n.e.c.	12886.26	13532.43	14178.60	14668.74	15496.56	16324.30
Hotels & other lodging places	4576.97	4698.24	4819.51	4940.98	5096.45	5251.92
Personal svces.	6674.36	6853.23	7032.10	7443.54	7672.85	7902.15
Private households	9018.12	9443.85	9869.58	10544.35	11090.14	11635.93
Commercial & trade schools and employment agencies	6821.52	7193.92	7566.32	7450.98	7929.40	8405.82
Business svces., n.e.c.	10586.37	11057.96	11529.55	11838.04	12442.63	13047.22
Misc. repair svces. & hand trades	9758.06	10497.12	11236.18	10053.81	11001.30	11948.79
Motion pictures	4511.73	5374.46	6237.19	4593.67	5699.70	6805.73
Amusement & recreation, except motion pictures	8076.67	8661.93	9247.19	9151.12	9901.44	10651.76
Medical & other health svces.	7333.43	7800.74	8268.05	7895.97	8495.06	9094.15
Legal svces.	21823.57	22988.37	24153.17	24200.04	25693.34	27186.64
Engineering & other prof. svces., n.e.c.	11979.35	12220.09	12460.83	13243.65	13552.29	13860.93
Educ. svces., n.e.c.	5697.67	5792.52	5887.37	6413.83	6535.43	6657.03
Non-profit membership organizations, n.e.c.	5684.21	5774.88	5865.55	6411.39	6527.63	6643.87
Federal general govt.	—[1]	—[1]	—[1]	—[1]	—[1]	—[1]
Federal govt. enterprises	7667.47	7981.53	8295.59	8860.16	9062.79	9465.42
State & local general govt.	6470.08	6609.86	6749.64	7346.07	7525.27	7704.47
State & local govt. enterprises	6564.15	6694.30	6824.45	7359.10	7525.95	7692.80
Rest of the world	920020.55	935140.66	950260.77	1091734.46	1111118.68	1130502.90

[1] Estimate of average output per worker not obtainable because of component estimates for Federal General Government.

* Per hour.

Table 16. Projected Rates of Growth in Current Dollar Value of Output per Worker and in National Income by Sector of Origin, 1959–70 (*per cent per annum*)

Industry	Output per worker	National income
Farms	1.71	0
Agric. svces., forestry, & fishing	2.98	3.90
Metal mining	3.09	4.03
Anthracite mining	0.27	−10.59
Bituminous & other soft coal mining	3.50	−4.37
Crude petroleum & natural gas	1.56	4.52
Nonmetallic mining & quarrying	3.19	3.32
Contract construction	3.17	4.00
Food & kindred prod.	3.27	2.76
Tobacco mfrs.	3.81	3.53
Textile mill prod.	1.16	−0.18
Apparel & other finished fabric prod.	2.05	1.92
Lumber & furniture prod.	2.79	1.86
Paper & allied prod.	2.78	3.34
Printing, publ., & allied ind.	3.04	3.46
Chemicals & allied prod.	3.48	3.63
Products of petroleum & coal	2.92	2.09
Rubber prod.	3.39	3.26
Leather & leather prod.	2.40	0.93
Stone, clay, & glass prod.	3.75	3.65
Metals, metal prod., & misc.	3.24	0.87
Machinery, exc. electrical	3.51	2.77
Electrical mach.	3.20	3.86
Transportation equip., exc. automobiles	3.95	1.89
Automobiles & automobile equip.	3.70	3.97
Wholesale trade	2.41	3.10
Retail trade & automobile svces.	1.90	2.40
Banking	2.95	4.06
Security & commodity brokers, dealers & exch.	4.51	4.46
Finance, n.e.c.	0.17	3.28
Insurance carriers	2.94	4.27
Insurance agents & combination offices	3.20	4.44
Real estate	3.36	3.67
Railroads	2.53	−0.25
Local & highway passenger transp.	2.44	0.70
Highway freight transp. & whsg.	2.53	4.02
Water transp.	3.50	3.16
Air transp.	3.88	4.79
Pipeline transp.	2.29	3.65
Services allied to transp.	3.23	3.43
Telephone, telegraph, & related svces.	3.55	4.34
Radio broadcasting & television	3.67	5.22
Utilities: electric & gas	3.73	4.19
Local utilities & public svces., n.e.c.	3.45	4.03
Hotels & other lodging places	1.87	2.18
Personal svces.	2.65	2.61
Private households	4.51	4.37
Commercial & trade schools & employment agencies	1.31	3.07
Business svces., n.e.c.	3.38	5.13
Misc. repair svces. & hand trades	1.04	3.96
Motion pictures	0.87	0.28
Amusement & recreation, exc. motion pictures	3.47	3.11

Table 16. Projected Rates of Growth in Current Dollar Value of Output per Worker and in National Income by Sector of Origin, 1959–70 (*per cent per annum*) (*continued*)

Industry	Output per worker	National income
Medical & other health svces.	1.69	4.19
Legal svces.	3.03	3.71
Engineering & other prof. svces., n.e.c.	2.41	4.98
Educ. svces., n.e.c.	2.99	8.86
Non-profit membership organizations, n.e.c.	3.23	3.65
Federal general govt.	N/A [1]	4.17
Federal govt. enterprises	3.21	3.48
State & local general govt.	3.23	9.79
State & local govt. enterprises	2.94	4.59
Rest of the world	5.06	4.71

[1] Civilian and military components separately estimated and combined in such way that over-all change cannot be determined.

Table 16. Three sets of generalizations may be drawn from this table. First, consider the growth rates of output per worker and the industry of their origin. This particular comparison does not yield positive results. More precisely, there does not appear to be a systematic relationship between the rate of growth of output per worker and the broad industrial classification. Most of the Service Trades and Recreation industries have relatively low projected rates of growth in output per worker. But Private Households, which falls in this category, has one of the very highest projected growth rates. A similar statement holds for Trade and Finance; in this case the Security and Commodity Brokers sector constitutes the principal exception. We might also observe that Agricultural and Extractive Industries vary quite widely from Anthracite Mining to Bituminous Mining, while the Construction and Manufacturing Industries exhibit comparatively little variability. But on the whole, it does not seem possible to associate particularly high or low projected rates of growth with specific industrial classes.

A second comparison of interest is that between the projected rates of growth of output per worker and national income by sector of origin. Scanning the two columns of Table 16 reveals that in twenty-four of the sixty-two industries, or in about 39 per cent of all industries, the projected rate of growth of the dollar value of output per worker exceeds the projected rate of growth in the dollar value of national income. This means, of course, that a decline in employment is anticipated in these twenty-four sectors. In other words, when output per worker increases more rapidly than industry output, the number of workers employed must decline.

The final generalization concerns the industrial origin of these projected sectoral declines in employment. The data for this comparison are summarized in Table 17. The most important source of expected decreases in employment is Construction and Manufacturing Industries, from the standpoint of both total number of member industries affected and of the percentage of the broad class concerned. In some two-thirds of the manufacturing industries, the projected growth in output per worker exceeds the projected growth in demand. Thus one should expect that there will be some absolute decline in employment in this category. Service Trades and Recreation, Agricultural and Extractive Industries, and Transportation also have fairly large percentages of their memberships in the group for which expected increases in output per worker exceeds the projected increase in demand. While sizable numbers or percentages of affected member industries does not necessarily imply an absolute decline in employment in the entire class, the substantial magnitude of the figures in the last column of Table 17 certainly indicates that an aggregate expansion of employment may be rather difficult.

Table 17. Industrial Origin of Predicted Employment Decreases

Industrial classification	Number of industries	Number in which projected rate of growth of output per worker exceeds projected rate of growth of national income	Industries showing employment decreases as a percentage of all industries in the particular classification
Agricultural & extractive ind.	7	3	42.9
Construction & mfg. ind.	18	12	66.7
Trade & finance	8	1	12.5
Transportation	7	3	42.9
Utilities & communication	4	0	0
Service trades & recreation	9	4	44.4
Professional svces.	4	0	0
Govt. & govt. enterprises	5	1	20.0
Totals	62	24	38.7

6. FORECASTS OF EMPLOYMENT, 1970 AND 1975

a. *Predicted Employment by Sector*

Predictions of sectoral and total employment, one of the twin objectives in this study, follow immediately from the forecasts of sectoral national income and average output per worker. Indeed, dividing the predicted national income originating in a given industry by the predicted average output per worker per year in that same industry yields the desired estimate. Table 18 contains the estimates for 1970 and 1975. The first block of three columns refers to 1970. The middle column of this block, entitled "Medium," is obtained by dividing the specific, predicted value of national income originating by the corresponding value of average output per worker. The "Low" column contains the estimates based on the *low* estimate of national income originating in each sector and the *high* estimate of average output per year in that sector. This column, consequently, shows the very lowest employment figures anticipated. Similarly, the "High" column records the very highest, inasmuch as it is based on the *high* national income estimates and the *low* average output predictions. The same designations hold for the second block of three columns, the low, medium, and high estimates for 1975.

In the discussion and tables that follow, we refer almost exclusively to the medium estimates of employment. While the low and high estimates do provide some probability bounds for the predictions, they are generally quite wide. One may very reasonably suppose that actual employment will fall within these limits. And in particular, the medium values should be representative.

When aggregated, the sectoral estimates lead to a predicted, full-time equivalent employment of 64.8 million in 1970 and 68.9 million in 1975. This may be compared to actual full-time equivalent employment of 56.7 million in 1959 and 57.7 in 1960. The forecasts thus show 1970 employment as 14 per cent greater than the actual 1959 employment. This implies an estimated rate of growth of 1.2 per cent per annum, a figure substantially lower than the corresponding projection for national income.

b. *Sectoral Employment Comparisons*

The specific forecasts in Table 18 having been made, the various ways in which sectoral employment is expected to change may now be examined. The basic data for such comparisons are presented in Table 19. The first column of this table shows the actual number of full-time equivalent employees by industry in 1959. Column 2 contains the specific estimates for 1970, while column 3 expresses the 1970 estimate as a percentage of the 1959 actual. Columns 4 and 5 contain the corresponding data for 1975.

The projected sectoral changes from 1959 to 1970 are shown in a different way in Table 20. This table consists of a classification of industries according as their projected rate of growth in employment exceeds or falls short of the estimated national average. Column 1 shows the twenty industries for which a decline in employment is forecast over the 1959–70 period. Next, by reference to Table 21, one sees that the industries of declining employment are rather heavily concentrated in the broad classification Construction and Manufacturing Industry. Agricultural and Extractive Industries, Transportation, and Service Trades and Recreation account for the remaining sectors in which a decline in the number of full-time equivalent employees is expected.

Column 2 of each table lists and classifies the twenty industries that are expected to increase in employment at a rate less than the national average. More precisely, this designation covers those industries whose 1970 employment prediction is 100 through 109.9 per cent of the actual 1959 figure. Again, a relatively heavy concentration in Construction and Manufacturing Industries is seen, with a sprinkling throughout all other broad groups except Professional Services. Of particular significance are the facts that: (*a*) sixteen of the eighteen industries in the Manufacturing sector—the most important sector in 1959—are expected either to decline or to grow more slowly than the national average; and (*b*) no important government sector and none of the Professional Services are included. These facts alone provide some insight into the predicted changes in the industrial composition of employment.

The third column shows those industries that are expected to grow at approximately the national average. This category includes industries whose 1970 projections lie between 110 and 118.9 per cent of

Table 18. Forecasts of Employment by Sector, 1970 and 1975

Industry	Projected employment 1970			Projected employment 1975		
	Low	Medium	High	Low	Medium	High
Farms	4,936,315	6,205,495	8,086,642	4,323,922	5,785,865	7,998,509
Agric. svces., forestry, & fishing	157,713	167,544	177,909	159,781	171,020	182,973
Metal mining	69,616	88,420	114,307	60,919	78,896	89,376
Anthracite mining	3,540	4,123	5,238	1,911	2,300	3,063
Bituminous & other soft coal mining	42,486	66,422	93,897	14,835	40,256	69,892
Crude petroleum & natural gas	321,744	424,277	563,866	341,136	484,926	697,167
Nonmetallic mining & quarrying	102,063	135,220	158,067	101,986	134,619	178,320
Contract construction	2,679,676	2,900,938	3,130,023	2,712,600	2,962,802	3,225,883
Food & kindred prod.	905,793	989,867	1,082,395	877,171	970,029	1,072,383
Tobacco mfrs.	63,716	75,072	88,862	58,411	73,880	88,793
Textile mill prod.	646,470	747,232	873,947	588,022	691,537	826,961
Apparel & other finished fabric prod.	857,669	974,752	1,106,573	839,506	977,404	1,133,080
Lumber & furniture prod.	668,464	837,957	1,029,038	623,654	813,579	1,029,794
Paper & allied prod.	426,763	508,740	604,434	422,450	515,059	626,002
Printing, publ., & allied ind.	531,610	559,127	586,688	536,879	567,335	598,620
Chemicals & allied prod.	490,010	559,797	638,813	484,051	561,348	650,098
Products of petroleum & coal	100,711	133,859	175,519	91,580	127,892	174,834
Rubber prod.	150,165	203,188	269,905	144,281	202,785	278,282
Leather & leather prod.	214,480	268,069	333,247	195,766	257,616	333,800
Stone, clay, & glass prod.	401,338	456,362	514,907	395,581	456,232	521,963
Metals, metal prod. & misc.	2,310,360	2,484,156	2,685,671	2,029,290	2,200,565	2,402,880
Machinery, exc. electrical	1,030,784	1,079,932	1,133,073	926,687	974,533	1,027,928
Electrical mach.	758,305	912,431	1,092,487	755,578	927,066	1,131,691
Transp. equip., exc. automobiles	472,918	499,582	529,301	403,647	428,884	457,361
Automobiles & automobile equip.	475,607	630,784	822,389	455,589	627,413	845,009
Wholesale trade	2,868,425	3,221,412	3,612,520	2,888,554	3,293,387	3,752,833
Retail trade & automobile svces.	7,309,268	7,877,340	8,462,137	7,375,783	8,051,261	8,768,716
Banking	637,950	704,263	778,038	655,334	731,527	817,507
Security & commodity brokers, dealers & exch.	76,719	94,573	119,398	77,568	97,425	126,007
Finance, n.e.c.	290,049	314,851	492,669	335,246	348,442	582,603

Table 18. Forecasts of Employment by Sector, 1970 and 1975 (*continued*)

Insurance carriers	687,866	969,862	1,378,123	682,477	1,002,659	1,490,142
Insurance agents & combination offices	244,812	262,242	281,146	251,730	271,834	293,877
Real estate	474,792	516,734	563,766	475,430	522,483	575,982
Railroads	524,756	682,032	864,338	440,522	573,115	751,893
Local & highway passenger transp.	219,747	231,174	243,287	202,098	214,582	227,936
Highway freight transp. & whsg.	838,975	901,456	968,258	871,306	944,367	1,023,271
Water transp.	99,654	119,530	144,482	94,455	117,201	145,213
Air transp.	140,971	170,181	210,556	144,501	178,003	226,262
Pipeline transp.	21,994	27,665	34,226	21,506	28,033	35,782
Services allied to transp.	166,767	187,897	210,573	165,093	188,853	214,580
Telephone, telegraph, & related svces.	747,948	810,020	878,938	749,555	817,930	894,646
Radio broadcasting & television	83,134	92,830	103,707	85,357	96,359	108,874
Utilities: electric & gas	583,079	617,327	653,912	586,635	624,767	665,795
Local utilities & public svces., n.e.c.	23,694	26,638	29,876	23,589	26,878	30,584
Hotels & other lodging places	488,214	519,977	533,421	492,045	529,701	569,725
Personal svces.	803,074	850,656	900,787	797,006	851,331	909,003
Private households	1,425,771	1,568,883	1,725,508	1,413,260	1,568,880	1,740,611
Commercial & trade schools & emp. agencies	40,039	47,090	54,910	40,480	48,708	57,991
Business svces., n.e.c.	776,331	864,250	960,000	817,208	920,685	1,034,730
Misc. repair svces., & hand trades	220,539	246,665	275,825	240,041	272,830	311,791
Motion pictures	122,840	159,343	209,804	112,579	150,250	206,062
Amusement & recreation, exc. motion pictures	213,547	249,227	290,079	210,536	250,324	296,637
Medical & other health svces.	1,759,203	2,035,358	2,210,346	1,869,407	2,204,806	2,591,100
Legal svces.	147,163	168,337	191,771	127,284	150,615	176,824
Engineering & other prof. svces., n.e.c.	274,849	302,059	330,363	292,766	324,629	357,976
Educ. svces., n.e.c.	950,509	1,048,110	1,156,262	1,266,781	1,433,341	1,622,276
Non-profit membership organizations, n.e.c.	775,441	832,331	891,035	793,509	858,353	925,548
Federal general govt.	5,063,315	5,292,572	5,521,829	5,151,446	5,390,496	5,629,546
Federal govt. enterprises	541,215	596,640	656,602	541,508	604,098	657,327
State & local general govt.	9,265,315	9,847,703	10,471,398	12,784,962	13,796,056	14,880,439
State & local govt. enterprises	352,346	378,680	406,056	363,474	393,747	425,393
Rest of the world	3,446	3,857	4,281	3,353	3,794	4,251

Table 19. Estimated Employment in 1970 and 1975 as Percentages of Actual Employment in 1959 (*employment figures in thousands*)

Industry	Emp. in 1959	Est. emp. in 1970	1970 Emp. as pct. of 1959	Est. emp. in 1975	1975 Emp. as pct. of 1959
Farms	7118	6205	87	5786	81
Agric. svces., forestry, & fishing	152	168	111	171	113
Metal mining	82	88	107	79	96
Anthracite mining	19	4	21	2	11
Bituminous & other soft coal mining	174	66	38	40	23
Crude petroleum & natural gas	303	424	140	485	160
Nonmetallic mining & quarrying	114	135	118	135	118
Contract construction	2892	2901	100.3	2963	102
Food & kindred prod.	1025	990	97	970	95
Tobacco mfrs.	79	75	95	74	94
Textile mill prod.	874	747	85	692	79
Apparel & other finished fabric prod.	1080	975	90	977	90
Lumber & furniture prod.	912	838	92	814	89
Paper & allied prod.	448	509	114	515	115
Printing, publ., & allied ind.	558	559	100.2	567	102
Chemicals & allied prod.	531	560	105	561	106
Products of petroleum & coal	155	134	86	128	83
Rubber prod.	199	203	102	203	102
Leather & leather prod.	332	268	81	258	78
Stone, clay, & glass prod.	449	456	102	456	102
Metals, metal prod., & misc.	3206	2484	77	2201	69
Machinery, exc. electrical	1134	1080	95	975	86
Electrical mach.	840	912	109	927	110
Transp. equip., exc. automobiles	615	500	81	429	70
Automobiles & automobile Equip.	574	631	110	627	109
Wholesale trade	2961	3221	109	3293	111
Retail trade & automobile svces.	7848	7877	100.3	8051	103
Banking	626	704	112	732	117
Security & commodity brokers, dealers & exch.	89	95	107	97	109
Finance, n.e.c.	226	315	139	348	154
Insurance carriers	821	970	118	1003	123
Insurance agents & combination offices	230	262	114	272	118
Real estate	500	517	103	522	104
Railroads	923	682	74	583	63
Local & highway passenger transp.	279	231	83	215	77
Highway freight transp. & whsg.	769	901	117	944	113
Water transp.	124	120	97	117	94
Air transp.	155	170	110	178	115
Pipeline transp.	24	28	117	28	117
Svces. allied to transp.	184	188	102	189	103

Table 19. Estimated Employment in 1970 and 1975 as Percentages of Actual Employment in 1959 (*employment figures in thousands*) (*continued*)

Industry	Emp. in 1959	Est. emp. in 1970	1970 Emp. as pct. of 1959	Est. emp. in 1975	1975 Emp. as pct. of 1959
Telephone, telegraph, & related svces.	745	810	109	818	110
Radio broadcasting & television	79	93	118	96	122
Utilities: electric & gas	588	617	105	625	106
Local utilities & public svces., n.e.c.	25	27	108	27	108
Hotels & other lodging places	503	520	103	530	105
Personal svces.	854	851	99	851	99.6
Private households	1592	1569	99	1569	99
Commercial & trade schools & emp. agencies	44	47	107	49	111
Business svces., n.e.c.	708	864	122	921	130
Misc. repair svces. & hand trades	174	247	142	273	157
Motion pictures	168	159	95	150	89
Amusement & recreation, exc. motion pictures	259	249	96	250	97
Medical & other health svces.	1503	2035	135	2205	147
Legal svces.	142	168	118	151	106
Engineering & other prof. svces., n.e.c.	230	302	131	325	141
Educ. svces., n.e.c.	564	1048	186	1433	254
Non-profit membership organizations, n.e.c.	793	832	105	858	108
Federal general govt.	4195	5293	126	5390	128
Federal govt. enterprises	580	597	103	604	104
State & local general govt.	5201	9848	189	13796	265
State & local govt. enterprises	318	379	119	394	124
Rest of the world	4	4	100	4	100

their actual 1959 value. There are twelve industries scattered throughout the broad industrial classifications. However, it is again notable that the Professional Services and Government sectors are almost without representation.

Finally, column 4 shows those industries that are expected to grow more rapidly than the national average, i.e., whose 1970 prediction is 119 per cent or more of the actual 1959 employment. Here one finds, with few exceptions, that Government and Professional Services dominate. And one immediately sees the poor prospects of expanding employment through the manufacturing sector: not a single one of the eighteen manufacturing and construction industries is represented in this category.

Table 20. Projected Change in Sector Employment, 1959–70

Declining industries	Ind. growing less rapidly than nat. avg.	Ind. growing at nat. avg.	Ind. growing more rapidly than nat. avg.
Farms	Metal mining	Agri. services, forestry & fishing	Crude petroleum & natural gas
Anthracite mining	Contract construction	Nonmetallic mining & quarrying	Finance, n.e.c.
Bituminous & other soft coal mining	Printing, publ., & allied industries	Paper & allied products	Business services, n.e.c.
Food & kindred prod.	Chemicals & allied products	Automobiles & automobile equipment	Misc. repair services & hand trades
Tobacco mfrs.	Rubber products	Banking	Medical & other health services
Textile mill prod.	Stone, clay, & glass products	Insurance carriers	Engineering & other professional services, n.e.c.
Apparel & other finished fabric prod.	Electrical machinery	Insurance agents	Educational services, n.e.c.
Lumber & furniture prod.	Wholesale trade	Highway freight transportation	Federal general government
Products of petroleum & coal	Retail trade & automobile services	Air transportation	State and local general government
Leather & leather prod.	Security & commodity brokers, etc.	Pipeline transportation	State & local government enterprises
Metals, metal prod., & misc.	Real estate	Radio broadcasting & television	
Machinery, exc. electrical	Services allied to transportation	Legal services	
Transp. equip., exc. automobiles	Telephone, telegraph, & related services		
Railroads	Utilities: electric & gas		
Local & highway passenger transp.	Local utilities & public svces., n.e.c.		
Water transp.	Hotels & other lodging places		
Personal svces.	Commercial & trade schools & employment agencies		
Private households	Non-profit membership organizations, n.e.c.		
Motion pictures	Federal govt. enterprises		
Amusement & recreation, exc. motion pictures	Rest of the world		

Table 21. Employment Changes by Broad Industrial Classification

Industrial classification	Number of component industries: Declining	Growing less rapidly than nat. avg.	Growing at nat. avg.	Growing more rapidly than nat. avg.
Agric. & extractive ind.	3	1	2	1
Construction & mfg. ind.	10	6	2	0
Trade & finance	0	4	3	1
Transportation	3	1	3	0
Utilities & communication	0	3	1	0
Service trades & recreation	4	3	0	2
Prof. svces.	0	0	1	3
Govt. & govt. enterprises	0	2	0	3
Totals	20	20	12	10

c. *The Changing Industrial Composition of Employment*

An alternative presentation of the employment predictions is contained in Table 22; this organization of the data helps to focus attention more precisely upon the prospective changes in the industrial composition of employment. The first block of columns in the table gives recorded, full-time equivalent employment in 1959, together with the medium projections for 1970 and 1975. The second block of columns contains data by means of which some important comparisons may be drawn. These data show sector employment as

Table 22. Employment and Its Composition, by Broad Industrial Classification, 1959–75 (*employment figures in thousands*)

Industrial classification	Employment			Sector emp. as pct. of total			Sector emp. as pct. of 1959 sector emp.		
	1959	1970	1975	1959	1970	1975	1959	1970	1975
Agric. & extractive ind.	7962	7090	6698	13.5	10.9	9.7	100.0	89.0	84.1
Construction & mfg. ind.	15903	14822	14337	27.0	22.9	20.8	100.0	93.2	90.2
Trade & finance	13301	13961	14318	22.6	21.6	20.8	100.0	105.0	107.6
Transportation	2458	2320	2254	4.2	3.6	3.3	100.0	94.4	91.7
Utilities & communication	1437	1547	1566	2.4	2.4	2.3	100.0	107.7	109.0
Service trades & recreation	5095	5338	5451	8.7	8.2	7.9	100.0	104.8	107.0
Prof. svces.	2439	3553	4114	4.1	5.5	6.0	100.0	145.7	168.7
Govt. & govt. enterprises	10298	16121	20188	17.5	24.9	29.2	100.0	156.5	196.0
Totals	58893	64752	68926	100.0	100.0	100.0	100.0	109.9	117.0

a percentage of total employment in the three years under review.

Reading across the rows, one sees that there is an expected decline in *importance* in all but Professional Services and Government. While only three broad groups are expected to decline in absolute employment, six of the eight categories will become relatively less important in the total employment reckoning. On the other hand, a slight increase is expected in Professional Services, from 4.1 per cent to 6.0 per cent of total employment. But a very appreciable shift is expected to occur in the Government sector. In 1959 the five components of the Government and Government Enterprise sector accounted for 17.5 per cent of aggregate, full-time equivalent employment. By 1970 this sector is expected to account for 24.9 per cent of total employment; by 1975 the predictions indicate that almost 30 per cent of total employment will be *directly* attributable to the Government sector.

The largest proportion of the Government sector increase will, according to the projections, occur in State and Local General Government. There could, of course, be institutional changes affecting the provision, supervision, and financing of such important functions as education, libraries and other cultural services, health and welfare services of all kinds, highways and secondary roads, etc. All of these functions, and many more, are currently in the hands of state and local governments. Thus expenditures on these classes of services directly augment the national income originating in State and Local General Government. To be sure, the federal government now subsidizes some of these activities; and the extent of federal financing can be expected to increase in the future. But so long as the operational organization is not changed, these expenditures and their consequent employment will be reflected in the State and Local General Government category.

d. *Employment, Unemployment, and the Labor Force, 1970 and 1975*

Detailed estimates of the labor force for 1970 and 1975 have been presented in Section 2. These estimates are not immediately comparable to the forecasts of employment. To permit comparison, the labor force estimates must be converted to "full-time equivalent" numbers. This cannot be done precisely because the number of part-time employees and the number of entrepreneurs cannot be predicted with certainty. The latter category, particularly, is subject to rather marked fluctuations in numbers. Nevertheless, using a medium labor force figure for 1970 and 1975, and reducing this to allow for part-time workers and for owners of business enterprises (see Section 2), we find that the projected rate of unemployment is about 8 per cent in 1970 and about 10 per cent in 1975.

One may consider 8 per cent unemployment very high, perhaps intolerably high. In any event, the thought of 8 to 10 per cent unemployed is alarming. It is, nevertheless, in accord with the postwar trend in the United States. In fact, such a prediction fits very well with what may be called the "stairstep effect."

Examine the data in Table 23. The left-hand column shows the percentage of unemployment during periods of relative prosperity, while the right-hand column shows the corresponding percentages for relatively depressed periods. These data illustrate the "stairstep effect." We begin in the immediate postwar years, 1946–48, with a period of relative prosperity. Even with the industrial dislocations and reconversions attendant upon war's end, the level of unemployment was comparatively low. It averaged 3.6 per cent over the three-year period. And it was during this time, as you may recall, that "3 per cent frictional unemployment" was regarded as tantamount to full employment.

Table 23. Unemployment Trends in the Postwar Years

Periods of relative prosperity		Relatively depressed periods	
1946–48	3.6%	1949–50	5.3%
1955–57	4.3%	1954	5.6%
1959–60	5.5%	1958	6.8%
1961	6.7%		

Following on the heels of this early postwar boom came the recession of 1949–50. The rate of unemployment rose to 5.3 per cent. In the Korean War period that followed, unemployment dropped to a very low level; but this may largely be attributed to the wartime military expenditures and the expanded size of our military forces. At the end of this period unemployment again rose to 5.6 per cent in 1954. The period 1955–57 constitutes the first fairly representative period of prosperity since 1948. The unemployment rate was down from the recession year 1954, but it averaged 4.3 per cent during the interval, substantially higher than the average of 3.6 per cent during the 1946–48 period.

Another recession struck the economy in 1958, with an accompanying rate of unemployment amounting to 6.8 per cent. Following this year of severe unemployment, we have had the relatively prosperous period from 1959 until now. During 1959 and 1960, however, the average level of unemployment was slightly higher than 5.5 per cent, while unemployment reached the 6.7 mark in 1961.

Taking a broad view, each successive period of relative prosperity has been accompanied by successively higher rates of unemployment. The same is true of the successive periods of relatively poor times. On the whole, the rate of unemployment during prosperous periods seems to increase by about 1 per cent following each recession. Thus we have climbed, step by step, to progressively higher levels of unemployment as our economy has passed through alternate periods of prosperity and recession. With the current rate somewhat in excess of 6.0 per cent, it is not hard to envisage 8 per cent unemployment by the end of the decade. According to the radical empiricism of the previous paragraphs, a couple of minor recessions during the 1960's would do the trick.

7. IMPLICATIONS FOR PUBLIC POLICY

It is no surprise when economists predict unemployment. Trained in the tradition of the dismal science, they are expert witnesses to the threat of diminishing returns, expanding populations, and the consequent Malthusian specter. Nor is it a surprise when economists' predictions are incorrect. Some of the estimates of unemployment after World War II were very wide of the mark, a part of the explanation apparently being the assumption that the pre-World War II propensity to consume would continue into the postwar years. The present set of predictions is, in a sense, even more risky; the first of the two selected dates is nine years distant, and the state of world tension at present all but precludes any prediction save that of hotter cold war.

In the absence of projections of this general sort, however, there is very little basis for discussion of the specific problem: the employment of older workers. One must have some notion of the relative demand for and supply of labor during the coming decade. Actually, there has been little agreement among gerontologists on this question. Writers have pointed to the economy's need for a larger labor force, which would include older persons. At the same time they have questioned individual firms' retirement policies, which surely indicate that a larger labor force is not needed. The conclusion that company retirement practice is a function of certain microeconomic variables is valid, of course, only within the context of economy-wide employment conditions. Therefore, attempts to provide jobs for older workers via changes in retirement practices, when successful, lead merely to a redistribution of available jobs. Only when the number of available jobs expands more rapidly than the labor force is there any real opportunity for increasing the employment opportunities of older workers.

When the rate of growth of jobs is slower than the rate of growth of the labor force, appropriate policy measures are necessarily quite broad in scope, with retirement policy being only one possible, and partial, solution. Let us consider the two major approaches to the problem: those that lead to increases in demand for goods and services and, therefore, presumably for labor; and those that reduce the size of the labor force.

a. *Policies Affecting the Demand for Labor*

With about 5.5 million people, or approximately 6.7 per cent of the labor force, currently unemployed, one would normally anticipate a series of federal government policies to alleviate unemployment. Even more, if the expected future rate of unemployment is in the neighborhood of 8 per cent, one must expect, and indeed urge, some type of governmental action to combat the situation.

Since the 1930's the traditional method of counteracting unemployment has been to stimulate aggregate demand. For the most part this has been accomplished by means of direct (federal) government expenditure; but to some minor extent, reliance has also been placed on tax-reduction policies. Under either policy, however, an increase in employment is expected to have its proximate origin in an increase in aggregate demand. Yet in a period in which the average output per worker is increasing rapidly, one must question the efficacy of government policies based solely upon augmenting the volume of aggregate demand for goods and services. This is especially true if the source of increased demand is direct federal government expenditure.

Recent increases in federal government expenditures have been, for the most part, directed toward military procurement. The result has been an augmented demand in Construction and the so-called heavy industries, such as Metals and Machinery. But these are the very industries in which average output per worker is growing relatively fast. As shown in Table 16, average output per worker may be expected to increase by about 3.5 per cent per annum in these industries. As a consequence, an increase in demand in these sectors is likely to have a much less than proportional effect upon employment. The chief result may be a reduction in the amount of excess capital facilities, without a material effect upon the level of employment.

This argument, of course, does not mean that direct expenditure by the federal government *cannot* reduce unemployment to the frictional minimum. It does imply that the required increase in aggregate demand may be so great as to cause an intolerable increase in the price level. While full employment and relative stability of prices are not necessarily incompatible, there has been more and more evidence in recent years that "cost-push" elements may couple with "demand-pull" forces to make a demand-led inflation especially serious.

In face of both excess productive equipment and idle workers, one might argue that an increase in demand will cause an increase in output without substantial effects upon the average level of prices. But such arguments ignore monopoly elements in both industry and organized labor. The market power which both of these groups can exert may lead to an increase in the price level in the absence of an increase in demand. When demand pressures also exist, it is quite likely that an increase in government expenditure, especially of the magnitude indicated by the present and expected volumes of unemployment, will spend itself largely in price-level increases. If this does in fact happen, the increase in employment associated with a government spending program may be negligible.

Despite the arguments just presented, it seems that a thoughtful program of demand stimulation can be effective in *reducing* unemployment, even though it seems hardly possible that a demand-side program can completely *eliminate* it. The crucial factor seems to be the *composition* of the demand increase. Augmenting the demand for hard goods may be comparatively futile; but there is still a rather broad field in the services—both personal and professional—in which a given increase in demand may be expected to result in an approximately proportional increase in employment.

As our system of federal-state-local governments is presently organized, this would mean that the demand stimuli should come largely from the state and local levels, rather than from the federal government. As many people have suggested, there is today a *bona fide* social need for a substantial expansion and improvement in the areas of education and other cultural outlets, and in health, welfare, and related programs. A carefully planned expansion program in these areas would result in services for which there is an unquestionable social need. Such a program would also tend to concentrate the increase in demand in those areas in which it is likely to be most fruitful, since it is in these areas that employment may be expected to increase in about the same proportion as demand and output.

In all likelihood, the state and local governments cannot undertake such expansion programs alone. A considerable volume of federal government subsidy will probably be necessary. In the first place, state and local governments probably could not finance a substantial expansion in these areas, partially because the federal government has a prior claim on the most lucrative revenue sources. In addition, individual state and local governments cannot be expected to tailor their expenditure policies to the needs of the nation as a whole. The federal government, on the other hand, can design its subsidy programs in accord with national employment needs.

A nationally sponsored program to expand services and, accordingly, services-connected employment, may reduce the level of unemployment to some extent. One should not, however, expect to remove unemployment by this means alone. Indeed, policies that rely exclusively upon stimulating aggregate demand, however carefully planned and skilfully executed, cannot eliminate unemployment from our economy. Pressures must be exerted upon the supply side as well.

b. *Policies Affecting the Supply of Labor: Delayed Entrance into the Labor Force*

The labor force grew by about 8 million during the 1950's; the non-institutional population 14 years of age and over increased by 14 million. Had the 1950 labor force rates prevailed in 1960, population growth alone would have raised the labor force by only

6.5 million, resulting in about 1.25 million more men and 2.75 million fewer women than we now have. Thus one of the two major factors responsible for long-run growth in the size of the labor force —the steady increase in the proportion of women who work outside the home—has become even more significant than expected. Since 1950 women have accounted for about 60 per cent of the growth in the labor force, their rate of participation increasing from 33 per cent in 1950 to 36.7 per cent in 1960. In the same period, the rate for men dropped from 85 per cent to 81 per cent.[25]

The other major factor accounting for labor-force growth during the 1950's was an increase in the number of persons of working age. Despite a drop in the participation rates for teen-age boys, the increase in number in the teen-age category raised the absolute number in the labor force. About 400,000 men and women under 25 joined the labor force in 1960 alone, and the net addition this age group will make to the labor force is expected to rise throughout the coming decade. In 1964–65, the number will be about 800,000. In total, the labor force grew by about 900,000 between 1959 and 1960, or by approximately the average yearly increase during the decade of the fifties.[26] Projections indicate a labor force of approximately 87,200,000 for 1970, or an average annual increase of 1,400,000 persons.

Since the labor force is being enlarged so rapidly by the entrance of new persons, particularly teen-agers, one might consider first the possibility of slowing labor force growth by postponing entrance into the labor market. Suppose, for example, that no persons aged 19 or under entered the labor force. For the year 1970 such an admittedly drastic policy would reduce the labor force by 8.1 million persons. By extending the period of education, society would purchase a better trained future labor force at the present expense of educational facilities and support programs for persons under 20 who would have joined the labor force. In real terms, the present cost of such a scheme is the sacrifice of the goods and services now made available by having these persons employed. In the present era of relatively high unemployment, such a cost does not appear exorbitant.

We are not, of course, advocating compulsory education through age 19. However, an expanded scholarship program, perhaps financed to a significant extent by the federal government, would enable more qualified students to obtain advanced education. It would also prevent early entrance into the labor force by a fairly substantial number of persons.

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[25] Robert L. Stein and Herman Travis, "Labor Force and Employment in 1960," *Monthly Labor Review,* 84 (1961), p. 349.

[26] *Ibid.,* p. 350.

c. *Policies Affecting the Supply of Labor: Reduction in the Average Workweek*

The factory workweek averaged 39.7 hours in 1960, about one-half hour per week lower than the 1959 average. Except for Transportation Equipment, all manufacturing industries had some reduction in hours worked per week. Cut-backs to part-time work were also more prevalent in 1960 than in 1959, the rise of "economic" part-time employment occurring chiefly among factory workers. Underemployment was also marked within the group that usually works part time, primarily because the workers could not find full-time jobs. The number of adult men in this category in 1960 was about 100,000 greater than it was before the 1957–58 recession.[27]

Further reductions in the workweek have been urged, particularly by labor union leaders, as a means of spreading out the number of jobs. Subject to a number of difficulties, a reduction in the hours worked per week could lead to a substantial increase in the number of persons employed. For example, reducing the workweek by two hours per week would increase employment by roughly 5 per cent. The difficulty of reducing the standard workweek is obvious, but a two-hour reduction in hours worked by even half the labor force would increase employment significantly.

A reduction in the number of hours worked per week would presumably not be accompanied by a commensurate reduction in weekly pay; to reduce the incomes of employees would simply restrict the demand for goods. Assuming no increase in productivity per hour as a result of the relatively slight reduction in hours worked, the cost of producing a given volume of goods would increase. The cost increases would probably cause price increases, so consumers as a group would pay for the increase in employment. The incidence of unemployment would thus be shifted from the unemployed themselves to all consumers.

In addition to cost considerations, various technical problems are involved in changing the number of hours worked, whether the change is accomplished by reducing the number of hours worked per week, by increasing the vacation period, or by some other technique. Business practices, geared to an eight-hour day and a five-day week, are seemingly difficult to rearrange, although our wartime experience indicated considerable upward flexibility. Despite the cost and scheduling difficulties, however, it seems likely that further increases in the level of unemployment will bring strong pressure for reduction in the number of hours worked per week.

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[27] *Ibid.*, p. 347.

d. *Policies Affecting the Supply of Labor: Compulsory Retirement at Age Sixty-five*

Sixty-five years has come to be the customary retirement age in most industries; retirement benefits, whether from public or private funds, most often begin at that age. In the United States the gradual acceptance of retirement at sixty-five is reflected in the steady decline in the labor-force participation rates of older men. Between 1890 and 1960 the rate for men aged 65 and over declined from 70.0 per cent to 32.3 per cent.

In 1960 about one of every five aged men worked full time for the entire year. Approximately one in two aged men worked at some time during the year. On the average, one in three aged men was in the labor force at any particular time. If all men aged 65 or older—7,503,100 in 1960—had been forced to retire, the labor force would have been reduced by about two and a quarter million. If all women had been forced to retire at 65, the labor force would have been reduced by another 0.9 million. If one assumes that compulsory retirement applies without exception to all persons 65 or over in 1970, the labor force in that year would be lower by 3.5 million persons. Obviously, a large percentage of these people would be giving up part-time jobs.

In the absence of broad changes in Social Security benefits and other public income-maintenance programs, such a policy would make unemployment bear most heavily on one of the lowest-income groups in the economy. If accompanied by governmental provisions for adequate incomes for the aged, the money costs of this scheme could be met by an increase in payroll taxes paid by the current labor force. The real cost would be measured in the same way as the cost of delayed entrance in the labor market: the additional volume of goods and services that could be produced by the group now removed from the labor force, after allowing for increased output and employment in other age brackets.

Recent action permitting men to retire at age 62, with some reduction in Social Security benefits, may be the first in a series of movements that will gradually reduce the accepted retirement age. Industry's attitude toward retirement will, of course, reflect the prevailing labor market situation, with a relaxation of compulsory practices when there is a tight labor market, and fairly rigid retirement policies when labor is plentiful. Governmental policy, too, develops as needs arise; the enactment of the OASDI program recognized the need, not only for old-age benefits, but for reducing the number of job applicants as well. If long-run unemployment in fact develops, there may be pressure further to restrict job opportunities for older men through compulsory retirement policies and reduction in retirement age.

Whether society chooses to lower retirement age, reduce the workweek, or delay entrance into the labor force, the basic decision is simply *when* people wish to take their leisure time. Any one individual may feel very little freedom of choice. A textile worker, for example, cannot quit at thirty-eight hours per week when forty is the company practice. Instead he may work forty hours per week till he is sixty-five, and then, again despite his wishes, retire. Similarly, the individual firm may find that some of its policies are largely determined by forces beyond its control. Seniority requirements, pension-fund costs, and promotion incentives for younger workers may dictate a fairly rigid retirement plan. Nevertheless, policies governing the length of the workweek and the age of retirement do get written into union-management contracts and into public legislation. These formal policies, which govern our working lives, necessarily take account of the basic conditions in the labor market.

But there is a danger in that the true nature of the dilemma—our apparent reluctance to accept an increasing amount of leisure—may go unrecognized. Leisure may accrue to a person when he least wants it, after he has come to regard work as all-important. Worse still, his "free time" may appear in the form of unemployment, which is generally distasteful whether unemployment compensation is available or not. The value of leisure, in other words, depends largely on the time and form in which it is made available. Although there are differences of opinion concerning the optimum distribution of leisure over the life span, failure to plan for the growing amount of leisure available forces the decision to go by default.

There is probably a majority opinion against further increases in leisure, favoring instead a continually larger volume of goods and services. The difficulty of utilizing a large proportion of the labor force in sectors enjoying rapid productivity gains has been discussed. In certain sectors of the economy, however, labor-force needs are growing rapidly. The demand for professional services, for example, will probably grow at a faster rate than the supply of these services. Furthermore, to meet this rising demand, the period of education must be lengthened, thus delaying entrance into the labor force and thereby helping to solve the problem on the supply side as well. The growing labor-force needs of this sector during the coming decade may prove to be a major factor in solving the anticipated imbalance between aggregate demand for and supply of labor.

e. *Summary and Conclusions*

The "stairstep" effect of unemployment, which has characterized the postwar era, lends support to the predicted 8 per cent unemployment for 1970. Reduced to its simplest terms, predicting increased unemployment is the inevitable conclusion drawn from projecting both a rapidly growing labor force and, for many sectors of the economy, a rapidly growing output per man hour. The growth of jobs, therefore, tends to lag behind the growth of the labor force. On the supply side, the imbalance is attributable to the sudden increase in the birth rate that occurred roughly two decades ago and to the steady increase in labor-force participation of women. On the demand side, the primary force is rapid technological advance.

Since the rate of mechanization is particularly rapid in manufacturing industries, the growing supply of labor can probably not be absorbed by augmenting demand in these industries. The traditional method of counteracting unemployment by stimulating aggregate demand is much less effective than it was some years ago. It therefore becomes more and more important to consider the *composition* as well as the *size* of the demand increase. Augmenting the demand for hard goods may bring relatively little increase in the demand for labor, whereas in the field of personal and professional services, a given increase in demand may result in an approximately proportional increase in employment.

To the extent that the balance between labor supply and labor requirements can be maintained through measures that stimulate demand, the demand stimuli should be directed primarily to services now provided by state and local governments. But the costs of such services cannot be borne by the state and local governments; they must be met from federal government revenues.

Our ability to produce larger and larger volumes of goods with fewer and fewer man-hours of labor enables us to enjoy not only more goods and services, but more leisure as well. In our society we are surprisingly reluctant to accept increased leisure, perhaps because we have relatively little choice as to when the leisure is taken. Total retirement at age 65 may be accepted only because it is inevitable, but few workers would find a shorter workweek undesirable. An extension of the period of education, which would postpone entrance to the labor force, would be somewhat comparable in effect to lowering the retirement age—both measures would reduce the number of years worked—but would probably be preferable from the point of view of both the individual and society.

By universal agreement, however, the least desirable form in which to take our free time is involuntary unemployment. Yet in order to avoid taking an increasing amount of leisure in this form, some reduction in the size of the labor force appears necessary. The usual methods of reducing the total labor time available are reduction in hours worked per week, delayed entrance in the labor force, and compulsory retirement at age 65 (or younger). The first two are probably more appealing to the individual, the second perhaps more socially desirable. It seems likely, however, that the long-run growth in unemployment will lead to the use of all three. Hence a lower retirement age, as well as a reduced workweek and extended education, should be envisioned in the future.

ADDENDUM

Just as this volume of essays was going to press, we received a prepublication copy of BLS Bulletin No. 24, a special report containing revised projections of the U. S. labor force. The chief revision concerned the participation rates of older men and women. In particular, the BLS expects the new provision governing retirement at 60 for women and 62 for men to have a substantial effect upon their participation in the labor force. More specifically, the

BLS revised schedule for Rate B shows a decline in the participation rate of men aged 55–64 from 89.2 to 85.2. Similarly, the rate for women in the same age bracket is expected to fall from 46.5 to 41.9.

The total effect of the revision is to lower the aggregate expected participation rate by 1.5 per cent. When the new schedule is applied to projected population, the result is a smaller anticipated labor force in 1970. If the new estimates are used in lieu of those contained in this paper, predicted unemployment in 1970 drops from 8 per cent to 7 per cent, but there is not an appreciable change in the prediction for 1975. While this change is 12.5 per cent of the original estimate, the projected rate of unemployment is nevertheless high. As a consequence, we do not feel that the conclusions, especially the discussion of policy, are materially affected.

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III. EMPLOYMENT OF OLDER WORKERS

B. TRENDS IN EMPLOYMENT AND EARNED INCOME OF OLDER WORKERS

1. INTRODUCTION

The preceding study projected labor availabilities to 1970 and to 1975 and offered some estimates of the quantity of labor required by the various sectors of the economy at these two dates. These estimates were made under the assumption that the recent (trend) rates of mechanization and of change in the composition of aggregate demand will continue until the terminal dates. By aggregating the sectoral demands for labor, it was found that the economy's labor requirements will probably fall considerably short of the aggregate supply of labor available, unless some exogenous force diverts the recently observable trends. Future employment prospects for workers of all ages must be considered in the light of this growing imbalance between the economy's demand for and supply of labor. The implication for older workers is particularly significant: earlier retirement and higher levels of involuntary unemployment will become progressively more likely.

The second conclusion pertained to the composition of labor demand. While the labor requirements of certain sectors of the economy are growing rapidly, the amounts of labor needed in other sectors are increasing very slowly if at all. This suggests that further study of interindustry shifts may shed light on the future employment prospects for workers of different age groups. What are the trends in the employment of older workers, both in total and by industrial sector? What effect have the different sectoral rates of growth had on the employment of older workers relative to that of younger workers? If these differential rates of growth continue, will the services of older workers become even less in demand than they are at present?

Table 1. Relative Importance of Wage and Salary and of Self-employed Workers, by Sector, 1957

Sector	Change in emp., 1950–1960	Pct. of non-farm emp., 1960	OASDI workers 65 and over as pct. of tot. OASDI emp. 65 and over	OASDI workers 65 and over as pct. of tot. OASDI emp. in each sector
Agriculture	−24.0		14.9	14.0
Mining	−21.3	1.3	0.8	2.3
Contract construction	23.5	5.3	5.5	3.5
Manufacturing	10.0	30.8	19.7	3.1
Public utilities & transp.	− 0.4	7.4	2.4	1.9
Wholesale & retail trade	21.6	21.0	20.9	3.7
Finance, insurance, & real estate	40.0	5.0	6.0	5.8
Services	36.8	13.5	22.2	6.5
Federal govt.	17.7	4.2	1.0	0.9
State & local govt.	52.5	11.5	6.6	6.7

Source: Data on total employment, excluding agriculture, from U. S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1312, *Employment and Earning Statistics For The United States, 1909–60* (1961). Data on agriculture from U. S. Department of Labor, Bureau of Labor Statistics, *Monthly Labor Review*, R. J. Stein and Herman Travis, "Labor Force and Employment in 1960" (1961), pp. 344 ff. Data on older workers from U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics*, preliminary 1957. Data in table computed from basic data in sources.

The magnitude of the shifts in employment by broad industrial sectors during the 1950's compels attention (see Table 1). Agriculture, for example, showed a 24 per cent decline in total employment between 1950 and 1960. But this decline is especially significant for older workers. In 1957, 15 per cent of all (OASDI) covered older workers were in Agriculture. Moreover, 14 per cent of the agricultural work force was 65 or over in that year, whereas only 5 per cent of the covered labor force was 65 or over. Thus the relative concentration of older workers in a declining sector contributes to employment problems that are already severe. This concentration is partly attributable to the fact that declining industries employ fewer new workers. Their employees thus tend to fall in the higher age groups. Mining, which suffered a large decrease (21 per cent) in employment during the 1950's, was less significant, since in 1960 that sector employed only 1.3 per cent of the non-farm workers and 0.8 per cent of all older employees. In this sector 2.3 per cent of the covered work force was 65 or over in 1957. Manufacturing, which showed some increase (10 per cent) in employment for the decade as a whole, had a decline in employment of 2.8 per cent in the latter part of the decade. This sector employed 30.8 per cent of all non-farm workers in 1960. In 1957, 20 per cent of all older workers under OASDI were employed in Manufacturing, and within the sector 3.1 per cent of the work force was over 65.

By contrast, covered employment in Services increased 36.8 per cent in the decade. This sector accounted for 13.5 per cent of non-farm employment in 1960, with 6.5 per cent of the sector's work force being 65 or over. The service trades employed a larger percentage of all covered older workers than any other sector in the economy in 1957: 22 per cent. Wholesale and Retail Trade, which increased by 21.6 per cent in employment during the 1950's, employed 21 per cent of all non-farm workers in 1960. Of the total number of covered older workers in 1957, 21 per cent were in this sector, and 3.7 per cent of all wholesale and retail employees were 65 and over. Finance, Insurance, and Real Estate enjoyed an increase of about 40 per cent in its employment during the decade. In 1957 this sector employed 6 per cent of all covered older workers; 5.8 per cent of the sector's work force was 65 or over. Only 5 per cent of non-farm employment was in this sector in 1960. To the older worker, perhaps the most encouraging development occurred in State and Local Governments, which enjoyed a 52.7 per cent increase in employment, employing 11.5 per cent of all non-farm workers in 1960. The percentage of this sector's work force aged 65 or over was higher in 1957 than the national average: 6.7 per cent, as compared with 5.0 per cent for the nation as a whole. Finally, 6.3 per cent of all covered older workers were in this sector in 1957.

In summary, older workers' employment prospects depend not only upon the relative size of the work force utilized by each sector and the rate at which this sector's employment is increasing (or declining); it also depends upon the proportion of each sector's total employment that is normally composed of older workers. In attempting to see whether any pattern of employment change has evolved over the past decade, the present study examines the changes in employment of older relative to younger workers, by broad industrial sector, during the period 1949–57. The earnings of older workers during this period are also studied, as is the change in sex composition of the older employed labor force. The resulting picture is only descriptive; nevertheless, the objective is merely to gain some perspective on the changing employment status of the older worker—a status that reflects changes in employment resulting from the mechanization of industry and from significant shifts in the composition of aggregate demand.

2. DATA AVAILABLE FOR STUDY

In order to relate the changing employment pattern of older workers to developments in the various industrial sectors of the economy, it is necessary to obtain data pertaining to workers by age, sex, and type of industry. The only source from which such data are available is the Bureau of Old Age and Survivors Insurance. This agency compiles a continuous work history sample composed of 1 per cent of all Social Security accounts.[1] On the basis of the information provided in this sample it is possible to examine the growth in the number of workers, their average earnings, and the sex composition of the work force in the different industrial sectors.

For purposes of the present study, a shortcoming of the data contained in the OASDI sample lies in the fact that the sample is very sensitive to increases in coverage resulting from changes in the Social Security Act. During the 1950's there were several important extensions in coverage; as a result there was a rapid expansion in the number of covered workers in many sectors. Extension of coverage to agricultural workers in 1951 and relaxing the income test for these workers in 1955, along with the inclusion of fishing employees, resulted in a tremendous expansion in the number of older wage and salary workers in Agriculture, Forestry, and Fishing included in this sample. The inclusion in 1951 on a voluntary basis of state and local government employees who were not protected under existing retirement programs, and the 1955 voluntary extension to those protected under existing retirement programs, had a significant effect on the government sector. The inclusion of non-farm and non-professional self-employed in 1951, of farm self-employed and some professional self-employed in 1955, easing the farm income test, the inclusion of farm landlords participating in a sharecropping arrangement, and the inclusion of other professional self-employed persons in 1956 caused a change in older self-employed coverage from zero in 1949 to 8,799 in 1957. For these reasons it was necessary to exclude agricultural workers, governmental employees, and self-employed persons in the analysis of growth in the number of workers in total and by sector.

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[1] The reliability of the data used is, of course, closely related to the size of the sample. For example, the 1950 OASDI *Handbook* indicates that in the 95 per cent confidence interval, the error of a sample of 50,000 will not be greater than 1 per cent while for a sample of 100 the error may be as great as 20 per cent.

Agricultural workers and government employees are excluded from Table 2, which shows the total and relative employment of covered wage and salary workers in the OASDI sample, 1949 through 1957 (the latest year for which data could be obtained from the Bureau of Old-Age and Survivors Insurance). From this table it will be noted that the number of covered older workers increased by almost 7,000 in the nine-year period, although older worker employment relative to total employment remained below 4 per cent even after the increase. Converting from the 1 per cent sample shows an increase of almost 700,000 in the number of covered older wage and salary employees.

Although some of this increase in the number of covered older persons employed was doubtless the result of coverage changes, the evidence indicates that a large part of the increase was attributable to an increase in the total number of older persons with jobs. Table 2 eliminates the effect of three changes in coverage, namely, the expansion of coverage to agricultural workers, to government employees, and to self-employed persons. The other major coverage change, the inclusion of domestic servants, resulted in an increase of approximately 170,000 older persons. The remainder of the increase, over 500,000, was presumably attributable primarily to an increase in the number of covered older workers employed.

According to reports from Social Security analysts, 3.0 million older persons had paid employment in 1950. By 1956 the number of older persons with covered employment was 3.5 million (see Table 9). Since only covered employment is included in the 1956 figure, the minimum increase in employment of older persons must have been at least 500,000. While our estimate does not include all gainfully employed, it is possible that the decline in employment of older persons attributable to a decline in agricultural employment was offset by an increase in older worker employment resulting from the expansion in state and local government employment.

The increase in the number of employed older workers from 1950 to 1956 is largely attributable to the relatively high level of economic activity during the period. In the same way that economy-wide conditions probably improved employment opportunities from 1950 to 1956, general economic conditions have surely reduced the older worker's chances of finding (or retaining) a job since that time. Preliminary OASDI estimates for 1957 indicate that the number of older persons with covered employment fell to 3.4 million. Other reports from Social Security analysts indicate that in 1960 the employment of older persons was again at the 1950 level of 3.0 million, despite an increase of 3.5 million in the aged population during the decade. Since data from the 1 per cent sample are not yet available beyond 1957, one must rely on data from other sources to indicate the sectors in which this decline occurred.

Table 2. Total and Relative Employment of Wage and Salary Workers 65 and Over, Excluding Agricultural Workers and Government Employees, 1949–57

Year	Number of workers 65 and over [a]	Index of number of workers (1949 = 100)	Workers 65 and over as pct. of tot. emp. [b]	Index of pct. of workers (1949 = 100)
1949	14,711	100.0	3.18	100.0
1950	14,704	99.9	3.09	97.2
1951	17,830	121.2	3.43	107.9
1953	20,062	136.4	3.70	116.4
1955	21,475	146.0	3.94	123.9
1957	21,681	147.4	3.98	125.2

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics, 1949, 1950, 1951–52, 1953–54, 1955* and preliminary 1957. Data in table computed from basic data in source.

[a] Number refers to the number of workers 65 and over in the 1 per cent OASDI sample, exclusive of agricultural workers and government employees.

[b] Total employment exclusive of agricultural workers and government employees.

Using 1950 as base, there was an average annual decline of 0.9 per cent in total employment in Manufacturing during the years

Table 3. Percentage Change [a] in Employment by Sector, 1950–60

Industry	1950–60	1950–51	1951–52	1952–53	1953–54	1954–55	1955–56	1956–57	1957–58	1958–59	1959–60
Agriculture	−24.0								−5.0	−0.1	−1.5
Mining	−21.3	3.1	−3.4	−3.6	−8.3	0.1	3.3	0.7	−8.5	−2.2	−2.4
Contract construction	23.5	11.6	1.3	−0.5	−0.5	8.1	8.4	−3.3	−6.2	7.6	−3.1
Manufacturing	10.0	7.6	1.6	6.0	−8.1	3.7	2.4	−0.5	−8.1	4.7	0.6
Public utilities & transp.	−0.4	4.8	0.5	1.0	−5.1	1.4	2.6	−0.1	−6.6	0.8	0.2
Wholesaling & retailing	21.6	3.8	2.7	2.6	−0.1	3.2	3.4	0.3	−1.4	4.0	3.1
Finance, insurance, & real estate	40.0	3.8	4.1	4.0	4.6	5.3	4.9	2.5	2.2	4.1	4.5
Services	36.8	3.6	2.9	2.5	2.5	5.1	4.9	4.0	1.2	5.5	4.8
Federal govt.	17.7	19.4	6.1	−6.0	−6.1	−0.1	1.1	0.4	−1.3	2.2	1.9
State & local govt.	52.5	−0.3	2.5	3.7	5.4	4.0	8.3	8.3	7.1	6.2	7.1

Source: U. S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1312, *Employment and Earning Statistics For The United States, 1909–60* (1961). Agricultural data from U. S. Department of Labor, Bureau of Labor Statistics, *Monthly Labor Review*, R. J. Stein and Herman Travis, "Labor Force and Employment in 1960" (1961), pp. 344ff. Data in table computed from basic data in source.

[a] Using 1950 base.

1957–60, although the industry showed an annual average increase of 1.8 per cent for the 1950–57 years (see Table 3). Since this industry employed almost one-third of all non-farm workers in 1960 (and one-fifth of all older workers), even a small percentage decline in employment is significant. Transportation and Public Utilities, which employs a much smaller per cent of all non-farm workers (7.4 per cent), increased in employment from 1950 to 1957 by 0.7 per cent per year but declined from 1957 to 1960 by 1.8 per cent annually. Contract Construction also showed a slight decrease in employment in the years 1957–60. In Mining, where employment declined throughout the decade, the annual average decrease was 1.2 per cent for 1950 to 1957 and 4.4 per cent annually for the remaining years.

There were only two sectors, Agriculture and Mining, in which employment declined from 1950 to 1957; but there were five sectors in which employment decreased from 1957 to 1960. In the three additional sectors, Contract Construction, Manufacturing, and Public Utilities and Transportation (each of which experienced increases in the earlier time period and decreases in the later one), the average annual increase in the number of employees from 1950 to 1957 was smaller than the average annual decrease from 1957 to 1960. The sectors that decreased from 1957 to 1960 employed about 45 per cent of all older covered workers in 1957.

In three of the five industrial sectors in which employment increased throughout the decade, the average increase in the absolute number of employees was smaller in the years 1957–60 than in the years 1950–57. Employment in Services increased by 4.0 per cent per year from 1950 to 1957 and by 3.9 per cent annually from 1957 to 1960. In Finance, Insurance, and Real Estate the average from 1950 to 1957 was 4.1 per cent and from 1957 to 1960, 3.7 per cent. The same pattern holds for the federal government sector.

The sectors in which employment decreased from 1957 to 1960 or in which the absolute average annual increase in the number of employees was smaller from 1957 to 1960 than from 1950 to 1957 employed almost 75 per cent of all older covered employees in 1957. In fact, only in Retail and Wholesale Trade and in State and Local Government were the absolute increases in employment greater in the later time period than in the earlier one.

In summary, the total number of older persons employed in covered wage and salary jobs (excluding Agriculture and Government) increased by about 700,000 in the period 1949–57. To the extent that the increase reflected an increase in job opportunities for older workers, the business recessions of 1957–58 and 1960–61 have doubtless contributed to the subsequent decline in jobs available to older persons. For the period 1949–57 older wage and salary employment relative to total employment in covered jobs remained less than 4 per cent.

3. EMPLOYMENT OF OLDER WORKERS

The extent to which the increase in employment of covered older workers was concentrated in certain industrial sectors is shown in Table 4. From this table it is clear that more than half of the increase occurred in Services, where coverage was expanded, and in Agriculture, Forestry, and Fishing, which was initially brought under the provisions of the Act in 1951. Wholesale and Retail Trade, second only to Services in the increase in numbers of older workers, was of course affected by coverage changes also. Finance, Insurance, and Real Estate showed some increase in the number of older workers, as did Contract Construction. It should be noted, however, that while the increase in the number of covered workers in Agriculture is altogether attributable to the expansion of coverage, the increase in

Table 4. OASDI Employment Data, Number [a] of Wage and Salary Workers 65 and Over, by Broad Industrial Classification, Corrected for Job Duplication and Government Employees, 1949–57

Industry	1949	1950	1951	1953	1955	1957
U. S. total	14,772	14,778	18,210	20,532	22,241	22,698
Agriculture, forestry, & fishing	61	74	380	470	766	1,017
Mining	327	281	272	232	246	245
Contract construction	1,110	1,145	1,537	1,699	1,579	1,371
Manufacturing	6,166	6,026	5,726	5,930	6,339	6,392
Public utilities	583	564	617	667	720	733
Wholesale & retail trade	3,597	3,646	4,550	5,280	5,551	5,509
Finance, insurance, & real estate	1,139	1,184	1,336	1,553	1,648	1,651
Services	1,788	1,857	3,792	4,698	5,392	5,781

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics, 1949, 1950, 1951–52, 1953–54, 1955* and preliminary 1957. Data in table computed from basic data in source.

[a] Number refers to the number of workers 65 and over in the 1 per cent OASDI sample.

other sectors is not. The rapid growth in Services and in Wholesale and Retail Trade brought significant expansions in these sectors—expansions that would likely have resulted in some growth in the number of older, as well as younger, employees, irrespective of coverage changes.

Except for Mining, a declining industry, Tables 4 and 5 reveal that employment of covered older workers has shown the least growth in Manufacturing. Covered older worker employment in Manufacturing rose 3.7 per cent between 1949 and 1957, as compared with 53.2 per cent in Wholesale and Retail Trade, for example. Table 6, showing the industrial composition of employment of older wage and salary workers, reveals that Manufacturing employed 41.7 per cent of the covered older workers in 1949, but only 29.2 per cent in 1957. Services, by contrast, employed only 12.1 per cent of all covered older workers at the beginning of the period, but 25.5 per cent at the end of this period. Again, the decline in the relative position of Manufacturing may be explained partly on the basis of the expanded coverage in Services, but partly, also, by the decreased employment opportunities for all workers in Manufacturing. The latter is attributable to several factors, the most important probably being the reduced amount of labor required per unit of output. In addition to this change in the sector's total labor requirements, the increasing rigidity of retirement policy in manufacturing industries accentuated the decline in demand for the services of older workers.

Table 5. Indexes of Corrected Employment of Covered Workers 65 and Over, by Broad Industrial Classification, 1949–57, Base 1949 = 100

Industry	1949	1950	1951	1953	1955	1957
U. S. total	100.0	100.0	123.3	139.0	150.6	153.6
Agriculture, forestry, & fishing	100.0	121.3	623.0	770.5	1,255.7	1,667.2
Mining	100.0	85.9	83.2	70.9	75.2	74.9
Contract construction	100.0	103.2	138.5	153.1	142.3	123.5
Manufacturing	100.0	97.7	92.9	96.2	102.7	103.7
Public utilities	100.0	96.7	105.8	114.4	123.5	125.7
Wholesale & retail trade	100.0	101.4	126.5	146.8	154.3	153.2
Finance, insurance, & real estate	100.0	104.0	117.3	136.3	144.7	145.0
Services	100.0	103.9	212.1	262.8	301.6	323.3

Source: Computed from data in Table 4.

The coverage changes, as well as the slower rate of growth in Manufacturing and the more rapid growth in Services, resulted in the latter sector's becoming as important as Manufacturing in the percentage of all covered older workers employed. This shift in the industrial composition of older-worker employment has significant implications, particularly in terms of earnings, since the service trades generally pay lower wages than manufacturing industries. Wholesale and Retail Trade, whose percentage of all older covered workers employed did not change during the period, continued to employ almost a fourth of all older workers. These three sectors—Manufacturing, Wholesale and Retail Trade, and Services—each employed approximately one-fourth of all older covered workers, in contrast to their 1949 proportions of 41.7 per cent, 24.4 per cent, and 12.1 per cent, respectively (see Table 6). Despite Agriculture's relative growth in number of covered employees, attributable exclusively to coverage extension, this sector nevertheless employed only 4.5 per cent of all covered older wage and salary workers in 1957.

Table 6. Industrial Composition of Employment of Older Wage and Salary Workers, 1949–57[a] (Percentages)

Industrial classification	1949	1950	1951	1953	1957
Agriculture, forestry, & fishing	0.4	0.5	2.1	2.3	4.5
Mining	2.2	1.9	1.5	1.1	1.1
Contract construction	7.5	7.7	8.5	8.3	5.7
Manufacturing	41.7	40.8	31.4	28.9	29.2
Public utilities	4.0	3.8	3.4	3.2	3.1
Wholesale & retail trade	24.4	24.7	25.0	25.7	23.9
Finance, insurance, & real estate	7.7	8.0	7.3	7.6	7.0
Services	12.1	12.6	20.8	22.9	25.5

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics, 1949, 1950, 1951–52, 1953–54, 1955* and preliminary 1957. Data in table computed from basic data in source.

[a] Excluding government employees.

The ratios of employment of older covered wage and salary employees, by broad industrial classification, are shown for selected years, 1949–57, in Table 7. The percentage for the United States as a whole rose from 3.2 per cent to 4.0 per cent, reflecting the improved labor-force position of covered older workers up to 1957. However, even during this relatively favorable economic period, older worker employment relative to total employment declined in Construction and Manufacturing. The increase in total employment in Construction and Manufacturing was 21 per cent, while the increase in employment of covered older workers was 7 per cent. Although OASDI data for the years 1958–62 are not available, it is evident from other data that total employment in this sector dropped sharply in 1957–58 (6.8 per cent) . Despite a subsequent rise in the sector's employment, the 1960 total was 3.0 per cent below that for 1956. Employment of production workers in Manufacturing in 1960 was 6.5 per cent below the 1956 level.

Table 7. Ratio of Employment of Older Wage and Salary Employees[a] to Total Employment, by Broad Industrial Classification, 1949–57, and Projected 1970 Sector Employment as Percentage of Sector Employment in 1959

Industry	1949	1950	1951	1953	1957	Projected 1970 emp. as pct. of 1959	1957 ratio as pct. of 1949
U. S. total	.032	.031	.034	.037	.040		125.0
Construction & Mfg.	.031	.029	.031	.033	.030	93.2	96.8
Trade & finance	.027	.027	.032	.037	.035	105.0	129.6
Transportation	.018	.017	.019	.021	.021	94.4	116.7
Utilities & communication	.013	.012	.012	.013	.012	107.7	92.3
Service trades & recreation	.029	.030	.049	.056	.061	104.8	210.3
Professional	.028	.030	.042	.049	.049	145.7	175.0

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics, 1949, 1950, 1951–52, 1953–54,* and preliminary 1957. Data in table computed from basic data in source. Projected employment in 1970 from Juanita M. Kreps, C. E. Ferguson, and James M. Folsom, "Labor Requirements and Labor Supply," Table 22, p. 95, this volume.

[a] Excluding agricultural and governmental employees.

In two important sectors the ratios of covered older workers to total employment increased significantly, namely in Service Trades and Recreation and in Professional Services. In the services, older workers as a percentage of total employment is, of course, high. In 1957, 15.7 per cent of the workers in private households were 65 or over, whereas only 4.0 per cent of all covered wage and salary workers were in the older age group. The extension of coverage to service workers therefore increased the ratio of older workers to younger workers who were covered, rather than increasing the ratio of older persons to younger persons who were employed. Since both the Service Trades and Recreation and the Professional sectors are expanding rapidly, however, any tendency for these sectors to increase the proportion of older workers employed in the future would be of significance. The major drawback to a shift of older workers into Services is the generally lower level of wages and salaries paid by that sector, as compared, say, with Manufacturing.

The generally unfavorable nature of the industrial composition of the 1957 covered older worker employment, relative to the composition of total covered employment, is shown in Table 8. This table contains indexes of the ratio of employment of older workers to total employment. The composition of total employment in 1957 is used as weights for the first column, the 1957 composition of older worker employment as weights in the second column. The ratio of older workers to total employment actually grew by 25 per cent, from .032 to .040. However, if the distribution of all employment had been the same as the distribution of older worker employment in 1957, the ratio would have increased by 35 per cent.

Table 8. Comparison of Indexes of Ratio of Employment of All Workers 65 and Over to Total Employment,[a] 1949–57, 1949 = 100

Year	Index using distribution of tot. 1957 emp. as weights	Index using distribution of 1957 emp. of 65 and over as weights
1949	100.0	100.0
1950	97.7	98.7
1951	116.6	122.8
1953	130.3	138.1
1957	125.0	134.9

Source: Computed from Table 7, using weights obtained from preliminary data to appear in *1957 Handbook of Old-Age and Survivors Insurance Statistics.*

[a] Excluding governmental and agricultural employees.

In other words, if all employees had been distributed among industries in the same relative proportion as older workers, total employment would have grown relatively less than it in fact did; therefore, the ratio of older employed workers to total employment would have increased by a substantially greater amount—by 35 per cent rather than 25 per cent. This implies that the employment of covered older workers is generally concentrated in the smaller and/or more slowly growing sectors of the economy. This conclusion holds, even though there has been a favorable shift in relative employment from Manufacturing to Services.

4. SEX COMPOSITION OF OLDER WORKER EMPLOYMENT

The rising labor force participation rates for women, characteristic of the entire postwar period, is reflected in the figures on older, as well as younger worker, employment. By any measure, the relative proportion of covered female employees in the older work force has increased. Table 9, which shows the total and relative employment of all older covered male and female workers from 1949 through 1957 (including self-employed), reveals that the number of older male workers increased from 1,265,000 in 1949 to 2,541,000 in 1957, while the number of older female workers rose from 225,000 to 863,000 in the same period. By 1957 the index of covered male workers aged 65 and over had doubled (on the 1949 base), while the index of covered older female workers had almost quadrupled. In terms of relative employment, older male workers declined from 85 per cent of the total number of covered older workers in 1949 to less than 75 per cent in 1957, while older female workers grew from 15 to 25 per cent of the total.

Table 9. Total and Relative Employment of All Workers, 65 and Over, by Sex, 1949–57 (*in thousands*)

Year	No. of workers 65 and over	Male workers 65 and over	Female workers 65 and over	Index of male workers (1949 = 100)	Index of female workers (1949 = 100)	Percentage male workers	Percentage female workers
1949	1,490	1,265	225	100.0	100.0	84.9	15.1
1950	1,495	1,262	233	99.8	103.6	84.4	15.6
1951	2,423	1,907	516	150.8	229.3	78.7	21.3
1952	2,609	2,035	574	160.9	255.1	78.0	22.0
1953	2,717	2,092	625	165.4	277.8	77.0	23.0
1954	2,741	2,081	660	164.5	293.3	75.9	24.1
1955	3,362	2,573	789	203.4	350.7	76.5	23.5
1956	3,512	2,658	854	210.1	379.6	75.7	24.3
1957	3,404	2,541	863	200.9	383.6	74.6	25.4

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics, 1955*, and preliminary 1957.

The index of covered wage and salary workers aged 65 and over, presented in Table 10, showed a smaller increase than the index for all older workers, since the latter reflected the extension of coverage to the self-employed. Excluding the self-employed, the index for 1957 was 144.9 for covered male employees 65 and over and 316.2 for older female workers.

Table 11 shows the relative industrial distribution of male and female employment, the last two columns of the table showing the 1957 ratio as a per cent of the 1949 ratio. For the United States as a whole, the increase in the ratio of covered older employed females to total covered female employment is twice the increase in the corresponding ratio for males. By industrial sector, older female employment has not only maintained its relative position in declining industries; it has grown much more rapidly in the expanding industries. In line with probable future sectoral shifts in total employment (from Manufacturing to Services), a continued growth in the percentage of women in the older labor force appears very likely.

Table 10. Total and Relative Employment of All Wage and Salary Workers 65 and Over, by Sex, 1949–57

Year	Number of male workers 65 and over[a]	Number of female workers 65 and over[a]	Index of male workers (1949 = 100)	Index of female workers (1949 = 100)	Percentage of male workers	Percentage of female workers
1949	12,533	2,239	100.0	100.0	84.9	15.1
1950	12,480	2,298	99.6	102.6	84.4	15.6
1951	14,664	3,849	117.0	171.9	79.2	20.8
1953	16,501	4,792	131.7	214.0	77.5	22.5
1955	17,449	5,937	139.2	265.2	74.6	25.4
1957	18,157	7,079	144.9	316.2	71.9	28.1

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics*, *1949*, *1950*, *1951–52*, *1953–54*, *1955*, and preliminary 1957.

[a] Number refers to number in the 1 per cent OASDI sample.

The shifting sex composition of the older work force, which has important implications for the earned income of the aged population, can be explained in large part by important changes in the composition of aggregate demand for goods. From Table 12 we see that in 1957, 47.7 per cent of all working women 65 and over (but only 19.5 per cent of older male workers) were employed in the Service Trades and Recreation and the Professional sectors. Construction and Manufacturing employed 42.5 per cent of males 65 and over and

Table 11. Ratio of Employment of All Workers 65 and Over to Total Employment, by Sex and Broad Industrial Classification, 1949–57

Industry	1949		1950		1951		1953		1957		1957 as percentage of 1949, male	1957 as percentage of 1949, female
	M	F	M	F	M	F	M	F	M	F		
U. S. total	.040	.015	.039	.015	.045	.022	.050	.026	.044	.033	110.0	220.0
Construction & mfg.	.037	.013	.035	.013	.037	.013	.039	.015	.033	.019	89.2	146.2
Trade & finance	.036	.014	.035	.014	.042	.016	.047	.020	.042	.024	116.7	171.4
Transportation	.019	.010	.018	.008	.020	.012	.021	.014	.021	.020	110.5	200.0
Utilities & communication	.019	.005	.018	.004	.018	.004	.019	.006	.017	.005	89.5	100.0
Service trades & recreation	.033	.019	.035	.019	.046	.054	.051	.063	.052	.074	157.6	389.5
Professional	.046	.014	.048	.016	.064	.026	.073	.034	.072	.036	156.5	257.1

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics, 1949, 1950, 1951–52, 1953–54,* and preliminary 1957. Data in table computed from basic data in source.

only 19.2 per cent of the females of the same age. A continued shift of demand from goods to services may bring with it a growth in the demand for female personnel that is greater, relatively, than the demand for male employees. With such a shift, earned income will increase less rapidly, or may actually decrease, because of the effect of employment shifts in the direction both of lower paying industries and the lower paid sex.

Table 12. Distribution of Wage and Salary Workers 65 and Over, by Sex and by Broad Industrial Classification, 1957

Industry	Male	Female
U. S. total [a]	100.0	100.0
Construction & mfg.	42.5	19.2
Trade & finance	33.6	31.7
Transportation	3.2	0.8
Utilities & communication	1.2	0.6
Service trades & recreation	11.1	29.2
Professional	8.4	18.5

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics*, preliminary 1957. Data in table computed from basic data in source.

[a] Excluding agricultural and governmental employees.

5. EARNED INCOME OF OLDER WORKERS

The aggregate earned income of covered older workers during the 1949–57 period increased, of course, since the number of workers covered by the Social Security Act increased markedly. Total earned income of the older group rose by about $16.5 billion during the period, from $23.9 to $40.4 billion. The average annual taxable earnings, computed on the basis of all covered wage and salary workers aged 65 or over, rose from $1,625 to $1,863, with a high of $1,961 during the Korean War. The increase of about 70 per cent in the aggregate earned income of covered older workers therefore resulted in an earned income increase of about 15 per cent per worker (Table 13).

When the earned income of older workers is deflated for price changes, it is clear that the average *real* earned income for this group

Table 13. Total Earned Income of Older Wage and Salary Workers, 1949–57

Year	Avg. taxable earnings [a]	Number of workers [b]	Tot. earned income	Index of tot. income [c]
1949	$1,625	14,711	$23,905,375	100.0
1950	1,695	14,704	24,923,280	104.3
1951	1,961	17,830	34,964,630	146.3
1953	1,958	20,062	39,281,396	164.3
1957	1,863	21,681	40,391,703	169.0

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics, 1949, 1950, 1951–52, 1953–54,* and preliminary 1957. Data in table computed from basic data in source.

[a] Average taxable earnings of all wage and salary workers 65 and over in OASDI sample, excluding agriculture workers and government employees.

[b] Number refers to the number of workers 65 and over in the 1 per cent OASDI sample, with above exclusions.

[c] 1949 = 100.

Table 14. Real Earned Income of Older Workers, 1949–57

Year	Consumer price index [a]	Avg. taxable earnings of older workers deflated	Tot. earned income of older workers deflated [b]	Index of deflated avg. taxable earnings [c]	Index of deflated tot. earned income [c]	Index of no. of workers 65 and over [c]
1949	101.8	$1,596	$23,482,687	100.0	100.0	100.0
1950	102.8	1,649	24,244,436	103.3	103.2	99.9
1951	111.0	1,767	31,499,667	110.7	134.1	121.2
1953	114.4	1,712	34,336,885	107.3	146.2	136.4
1957	120.2	1,550	33,603,746	97.1	143.1	147.4

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics, 1949, 1950, 1951–52, 1953–54,* and preliminary 1957. Consumers price index from U. S. Department of Commerce, *Business Statistics, 1959, Supplement to Survey of Current Business,* p. 30.

[a] Base 1947–49 = 100.

[b] Total income of wage and salary workers 65 and over in the 1 per cent OASDI sample, excluding agriculture workers and government employees.

[c] Base 1949 = 100.

declined. Table 14, showing real earned income of older workers, reveals a decline from $1,596 in 1949 to $1,550 in 1957, a decrease of about 3 per cent. Thus, although aggregate earnings for covered older workers rose by 70 per cent, and average taxable earnings rose by 15 per cent, the rise in the price level more than offset the average increase in earnings, leaving the average older worker with less purchasing power from earned income in 1957 than he had in 1949.

Table 15 shows the average earned income of older wage and salary workers by broad industrial classification. The average earnings of all workers is lower for each year than the average earnings given in Table 13 because Table 15 includes agricultural workers, whose average incomes are considerably below the general average. From Table 15 it is clear that Manufacturing has consistently been the highest paying industry, and that Services is the lowest paying nonagricultural sector of the economy.

A review of Table 6 in conjunction with Table 15 helps to explain the failure of older workers' incomes to keep pace with the general rise in wage incomes during the 1949–57 period. Employment opportunities in the highest-paying sector, Manufacturing, declined markedly. As this decline occurred, older workers found some expansion of employment opportunities in the lowest paying sector, Services. The movement of workers from Manufacturing to Services is thus naturally accompanied by a decline in average earnings. Although this sectoral shift in employment is only one of the factors accounting for the fact that the average (money) wage of the older worker has risen more slowly than the average wage of the younger worker, it should be noted that a continued shift of employment toward Services may have important implications for all workers, but particularly for the older employee.

Table 15. Average Earned Income of Older Wage and Salary Workers, by Broad Industrial Classification, 1949–57 [a]

Industrial classification	1949	1950	1951	1953	1957
U. S. total	$1,617	$1,692	$1,900	$1,884	$1,824
Agriculture, forestry, & fishing	896	913	1,294	1,293	843
Mining	1,532	1,785	2,300	2,068	2,275
Contract construction	1,382	1,472	2,008	1,877	1,854
Manufacturing	1,876	2,008	2,372	2,414	2,497
Public utilities	1,658	1,697	2,146	2,248	2,179
Wholesale & retail trade	1,469	1,502	1,733	1,714	1,653
Finance, insurance, & real estate	1,563	1,634	2,017	2,058	1,996
Services	1,231	1,228	1,299	1,350	1,272

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statstics, 1949, 1950, 1951–52, 1953–54,* and preliminary 1957. Consumers price index from U. S. Department of Commerce, *Business Statistics, 1959, Supplement to Survey of Current Business,* p. 30.

[a] Excluding government employees.

The ratios of average annual wages of older workers to those of all workers, by detailed industry breakdown, are shown in Table 16.

Table 16. Ratio of Average Annua Wages of All Wage and Salary Workers 65 and Over to National Average Wages, by Industry, 1948–57

Industry	1948	1949	1950	1951	1953	1957
U. S. total	1.002	.985	1.002	.942	.877	.779
Agriculture, forestry, & fishing		1.060	1.090	.985	.864	.850
Farms	1.111	1.001	1.166	.971	.843	.824
Agriculture & similar svces.	1.109	1.258	1.099	1.284	.947	1.291
Fishing	.776	.717	.863	.430		.735
Mining		.843	.927	.836	.723	.847
Metal mining	1.151	1.196	1.202	.955	.871	.878
Anthracite	.873	.790	.814	.988	.767	.830
Bituminous	.822	.637	.834	.782	.602	.781
Crude petroleum & natural gas	.917	.910	.873	.698	.647	.754
Non-metallic mining	1.273	1.276	1.227	1.012	.873	1.076
Contract construction		1.050	1.094	.866	.755	.873
General contractors	1.169	1.122	1.202	.882	.806	.936
Other contractors	1.021	1.267	1.222	.872	.725	.901
Special trade	1.091	.965	1.037	.849	.724	.935
Manufacturing		1.060	1.104	1.001	.955	.916
Ordnance & accessories	1.332		.899	1.120	.913	.963
Food & kindred prod.	1.269	1.202	1.230	.968	.920	.967
Tobacco	.970	1.014	.916	.893	.850	.851
Textile mill prod.	1.158	1.106	1.116	1.042	1.008	1.027
Apparel	1.417	1.320	1.285	1.163	1.061	1.055
Lumber & wood prod.	1.347	1.311	1.314	1.032	.978	1.056
Furniture	1.291	1.227	1.446	1.000	1.025	1.026
Paper	1.318	1.193	1.314	1.126	1.042	1.035
Printing	1.307	1.303	1.265	1.106	1.031	1.035
Chemicals	1.101	.997	1.137	.914	.941	.895
Products of petroleum & coal	.929	.947	.890	.884	.748	.836
Rubber prod.	1.111	1.047	1.233	.937	.996	.792
Leather & leather prod.	1.321	1.181	1.238	1.056	1.076	1.140
Stone, clay, & glass	1.233	1.107	1.294	1.048	.956	1.082
Primary metals	1.080	.985	1.088	.922	.908	.959
Fabricated metal	1.336	1.201	1.287	.997	.961	1.118
Machinery, exc. electrical	1.188	1.070	1.189	.984	.930	.991
Electrical machinery	1.164	1.105	1.289	1.115	1.067	1.045
Transp. equip.	1.212	1.106	1.188	1.012	.977	.922
Instruments	1.171	1.059	1.079	.973	.950	1.051
Misc.	1.432	1.267	1.416	1.175	1.050	1.319
Public utilities		.997	1.004	.964	.847	.864
Local railway & bus lines	.932	.919	.903	.907	.719	.884
Trucking & whsg.	1.146	1.149	1.206	.827	.886	.939
Highway transp., n.e.c.	1.104	1.136	1.317	.999	.965	1.051
Water transp.	1.100	1.045	1.197	.841	.811	1.007
Air transp.	1.350	1.510			.918	.981
Pipe line transp.	.707	.635			.517	1.011
Transp. svces.			1.347	1.078	.977	.959
Telecommunications	.882	.836	.739	.677	.744	.788
Utilities & sanitary svces.	1.217	.824	.785	.842	.816	.798
Wholesale and retail trade		1.195	1.217	1.034	.968	.847
Merchant wholesalers	1.339	1.286	1.275	1.025	.979	1.097
Other wholesale trade	1.059	.996	1.029	.890	.836	.864
Building materials	1.322	1.298	1.256	.858	.811	.898

Table 16. Ratio of Average Annual Wages of All Wage and Salary Workers 65 and Over, to National Average Wages, by Industry, 1948–57 (*continued*)

Industry	1948	1949	1950	1951	1953	1957
General mdse.	1.803	1.705	1.765	1.380	1.279	1.261
Food	1.242	1.151	1.248	.973	.929	.949
Automobile dealers & svce. stations	1.060	.987	1.117	.853	.838	.956
Apparel	1.560	1.496	1.566	1.154	1.080	1.325
Furniture	1.405	1.335	1.342	.817	.932	1.000
Eating & drinking	1.282	1.297	1.308	1.104	1.018	1.209
Misc.	1.131	.929	1.464	1.157	.999	1.150
Finance, insurance & real estate		1.006	1.035	.914	.890	.915
Banking	.967	.949	1.060	1.038	1.033	1.029
Credit agencies	1.078	1.048	1.123	1.037	.988	.908
Security & commodity brokers	1.083	.979	1.165	.938	1.099	1.047
Insurance carriers	1.016	.933	.956	.911	.885	.906
Insurance agents	1.387	1.372	1.286	1.294	.933	1.033
Real estate	1.250	1.287	1.286	.969	.918	1.068
Combination offices	.943	.998	.982	.876	.786	1.102
Holding companies	.527			1.054	1.168	.924
Services		1.220	1.221	.911	.852	.888
Hotels, etc.	1.493	1.543	1.461	1.129	1.118	1.244
Personal svces.	1.276	1.270	1.275	1.047	.958	.959
Misc. business svces.	1.192	1.139	1.135	.880	.855	1.073
Auto repair	1.144	1.139	1.214	.838	.785	1.086
Misc. repair	1.109	1.050	.901	.692	.682	.893
Radio & television				1.026	.904	.701
Motion pictures	1.349	1.407	1.515	1.104	1.109	1.327
Amusement & Recreation, n.e.c.	1.726	1.644	1.804	1.237	1.252	1.424
Medical & other health svces.	1.029	1.000	.918	.964	.941	.927
Legal	1.119	1.026	1.044	.828	.732	.720
Educational	1.601	1.605	1.418	1.060	.919	.990
Nonprofit membership organizations	1.294	1.234	1.124	.908	.863	1.047
Private households				1.034	.884	.950
Misc. svces.			1.111	.922	.998	1.061

Source: U. S. Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, *Handbook of Old-Age and Survivors Insurance Statistics, 1948, 1949, 1950, 1951–52, 1953–54,* and preliminary 1957. Data in table computed from basic data in source.

The older worker's ratio increased in only 6 of 89 industries during the 1949–57 period. Each of these six industries, it may be noted, is small in size and in its contribution to older-worker employment. Similarly, in 1957, older workers had higher average wages in only 33 of the 89 industries, and most of these were industries in which total employment was declining or growing less rapidly than the national average. Many of them also were either generally nonunionized industries without mandatory retirement policies or high-skill industries in which older workers occupied crucial positions. By implication, the older person appears to be able to maintain his relative earning position more readily in industries which are becoming less important in the national aggregate, which are relatively nonunionized, or in which the occupations call for years of training. The last category, however, is becoming progressively less important with the steady advance of mechanization.

Table 17, summarizing the data detailed in the preceding table, again shows the general tendency for wages of older workers to decrease less rapidly in those industries that are declining or are growing less rapidly than the national average. The one notable exception is Utilities and Communication. At the same time, however, this is the only broad industrial classification in which the ratio of older workers to total employment has declined.

In conclusion, changes in the industrial composition of older-worker employment help to explain the fact that the average earned income of older workers failed to maintain its relative position. Apparently, the older person's opportunity for finding or retaining a job is greater in those industries that are growing less rapidly than the national average (or are actually declining), or in Services, which is the lowest paying non-agricultural sector. The increasing proportion of women in the older work force further reflects the economy's increasing demand for Services; and in turn, it serves to hold down the average earned income of the older worker.[2] In the absence of some reversal of trends in the composition of aggregate demand, and hence in the industrial and sex composition of the older work force, the prospect for increasing the average earned income of workers aged 65 and over does not appear to be favorable.

The foregoing analysis of movements in the *earned* income of aged workers in covered jobs does not, of course, present the complete income picture for this group. In fact, more than half of the aggregate income accruing to persons aged 65 and over in 1960 came from income-maintenance programs.[3] By mid-1961 old age, survivors, and

[2] An increase in the relative number of part-time workers would, of course, also tend to hold down the average earned income of older workers. However, there was little evidence of such a trend. For example, 29.4 per cent of the civilian noninstitutional population 65 and over had work experience in 1950 and 30.8 per cent had work experience in 1955. Fourteen per cent of the older people held full-time jobs for 50 weeks or more in 1950 and 13.9 per cent in 1955. *Current Population Reports, Labor Force,* Bureau of the Census, Department of Commerce, Series P-50, No. 35 (1951), Table B, p. 3, and No. 68 (1956), Table B, p. 3.

[3] Lenore Epstein, "Money Income of Aged Persons, Mid-1960," *Social Security Bulletin,* Jan., 1961, p. 12.

Table 17. Ratio of Average Annual Wages of All Wage and Salary Workers 65 and Over to National Average Wages, by Broad Industrial Classification, 1948–57, and Projected 1970 Sector Employment as Percentage of Sector Employment in 1959

Industry	1948	1949	1950	1951	1953	1957	Projected 1970 employment as percentage of 1959	1957 ratio as percentage of 1948–49
U. S. total	1.002	.985	1.002	.942	.877	.779		79.1
Agriculture & extractive ind.		.978	1.028	.928	.810	.849	89.0	86.8
Construction & mfg.		1.059	1.103	.981	.925	.910	93.2	85.9
Trade & finance		1.165	1.188	1.015	.956	.858	105.0	73.6
Transportation	1.085	1.094	1.067	.774	.871	.963	94.4	88.8
Utilities & communication	1.019	.831	.758	.745	.774	.792	107.7	95.3
Service trades & recreation			1.244	1.019	.967	1.080	104.8	86.8
Professional	1.184	1.149	1.049	.960	.908	.956	145.7	80.7

Source: Annual ratios computed from Table 13, using 1957 distribution of total employment as weights. Weights computed from basic preliminary data to appear in *1957 Handbook of Old-Age and Survivors Insurance Statistics*. Projected employment in 1970 from Juanita M. Kreps, C. E. Ferguson, and James M. Folsom, "Labor Requirements and Labor Supply," Table 22, p. 95, this volume.

disability insurance and public assistance provided some or all the support for three-fourths of all aged persons, while less than one-fourth of the aged had money income from employment.[4] In addition, income payments from private pensions and deferred profit-sharing plans, plus annuities and annuity settlements under life insurance policy proceeds, were estimated to be about $1.67 billion in 1960,[5] and this figure has doubtless increased since then.

The wealth of detail on money income of persons and families provided by Lenore Epstein, plus the recent data provided by the Bureau of the Census,[6] makes further analysis of the current size and sources of the aged's total income unnecessary. The function of the present survey of changes in the earned income component is to examine postwar trends in earnings of older persons with particular reference to changes in the industrial and sex composition of older-worker employment. Further analysis of trends in earned income of older persons, moreover, may indicate factors other than shifts in industrial and sex composition that help to explain the changing relative income position of the aged. In singling out the earned income portion for analysis, however, it must be recognized that any discernible trends in the size of this portion may be offset, partially or altogether, by opposite changes in other income sources. The *Social Security Bulletin,* in particular the works on money income cited earlier, provides data on changes in the magnitudes of the various components of the aged's income.

6. SUMMARY AND CONCLUSIONS

In this study and the one preceding the major objective has been to examine some of the recent trends conditioning the demand for the services of older workers. Changes in employment during the postwar period, resulting from increased mechanization of industry and from significant shifts in the composition of aggregate demand, have been analyzed by industrial sector. A projection of these employment trends throws some light on the probable future demand for labor and on its industrial composition.

Changes in the proportions of the labor force employed by the various industrial sectors have been analyzed in the present study, and an attempt has been made to discern whether, within these broad industrial shifts, particular sectors of the economy appear to be absorbing larger percentages of older workers. Trends in the earned incomes of older workers, by industrial sector, have also been reviewed, as well as changes in the sex composition of the older work force. Finally, particular attention has been paid to the apparent decline in employment opportunities for older workers, which began in the 1957–58 recession and continued through 1960.

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[4] Lenore Epstein, "Sources and Size of Money Income of the Aged," *Social Security Bulletin,* Jan., 1962, p. 13.

[5] Epstein, *op. cit., Social Security Bulletin,* Jan., 1961, p. 15.

[6] U. S. Department of Commerce, Bureau of the Census, *Current Population Reports,* Consumer Income Series, P-60, No. 37, 1962.

Between 1949 and 1957 the number of covered older workers increased by about 700,000, excluding agricultural workers and government employees. If allowance is made for the expansion of coverage to domestic servants, the remainder of the increase—about one-half million workers—was apparently due to an increase in the number of older persons employed. The relatively high level of economic activity, which improved job opportunities from 1949 to 1956, was not maintained during the remainder of the decade. Between 1957 and 1960 the number of older persons with covered employment fell; according to Social Security reports, the total number of older workers was approximately the same (3.0 million) in 1960 as in 1950.

The recession of 1957–58 resulted in a slight decline in total Manufacturing employment during the last three years of the decade. Employment in Transportation and Public Utilities and in Contract Construction also declined during this period. In all of these sectors total employment increased between 1949 and 1956. In two other sectors, Agriculture and Mining, total employment declined throughout the decade of the fifties. In three of the five sectors in which employment increased throughout the decade (Services; Finance, Insurance, and Real Estate; Federal Government), the average increase in absolute numbers of employees was smaller in the 1957–60 years than in 1950–56. In total, the sectors in which employment decreased from 1957 to 1960, or in which the absolute average annual increase in employment was smaller for the last three years, employed almost 75 per cent of all covered older workers in 1957.

Except for Mining, which is a declining industry, employment of covered older workers showed the least growth in Manufacturing. In this sector, covered-worker employment increased 3.7 per cent between 1949 and 1957, as compared with an increase of 53.2 per cent in Wholesale and Retail Trade. As a consequence of differential rates of industry growth, as well as changes in coverage, Manufacturing employed 41.7 per cent of all covered older workers in 1949, but only 29.2 per cent in 1957. Services, by contrast, employed only 12.1 per cent of all covered older workers at the beginning, but 25.5 per cent at the end of the period. Three sectors—Manufacturing, Wholesale and Retail Trade, and Services—each employed approximately one-fourth of all older workers in 1957, in contrast to their 1949 proportions of 41.7 per cent, 24.4 per cent, and 12.1 per cent, respectively.

Aggregate earned income of covered older workers increased during the 1949–57 period, since the number of covered workers increased markedly. The $16.5 billion increase in the group's total earned income raised the average taxable earnings of all covered wage and salary workers aged 65 and over from $1625 in 1949 to $1863 in 1957, with a high of $1961 during the Korean War. Deflated for price changes, however, the average earned income in real terms declined by about 3 per cent.

A review of earnings of older workers by industry reveals that Manufacturing has consistently been the highest paying and Services the lowest paying (non-agricultural) sector of the economy. The failure of older workers' incomes to keep pace with those of younger workers is partly explained by this extreme difference in average earnings and by the changing industrial composition of older worker employment. As employment opportunities for older persons decline in the higher paying sector and expand in the lower paying one, the shift in employment is accompanied by some decline in average earned income. Aside from Services, the older person's opportunity for finding or retaining a job appears to be better in those industries that are growing less rapidly than the national average or are actually declining.

The deterioration in the earned income position of the older worker is further explained by the increasing proportion of women in the older work force. By industrial sector, older female employment has not only maintained its relative position in declining industries; it has grown in the expanding industries. Furthermore, a continued shift of demand from goods to services is likely to bring with it a growth in the demand for female personnel that is relatively greater than the demand for male employees. The probable effect of such shifts in demand for goods and services, and hence in the demand for labor, will be to diminish the average earned income of all aged workers, since the movements will likely be toward both lower paying industries and the lower paid sex.

Juanita M. Kreps
C. E. Ferguson
James M. Folsom

III. EMPLOYMENT OF OLDER WORKERS

C. IMPLICATIONS: THE MAINTENANCE OF INCOME

Analyses of present and future job opportunities for older workers should take account of significant postwar trends in the economy. In broad terms, the gradual growth in the level of unemployment, despite rising incomes and prices, has focused attention on the growing imbalance between the aggregate level of demand for labor and the size of the available labor force.

This imbalance has occurred because the labor force has expanded rapidly during a period of equally rapid technological progress. Confronted with the jump in birth rates two decades ago and the subsequent expansion in the number of children, the economy has responded by raising its level of output at such a rapid rate that per capita income, even for the growing population, has steadily increased. During the past two decades this increased product has been attributable partly to a gradual increase in the size of the labor force and partly to a rapid rate of mechanization.

The rate of automation in particular sectors of the economy has enabled certain industries to expand their output enormously without a significant expansion in the size of their work force. Increased output per man-hour during the past two decades thus helps to explain the ability to meet the increasing demand for goods and services on the part of a growing number of younger, non-working persons.

But the problem of producing enough goods and services for a rapidly expanding younger population, when the labor force is growing only moderately, is no longer with us. The expanded number of younger persons is now entering the labor force, and it has been doing so since the late 1950's. The problem of absorbing these new entrants into the labor force must now be considered, along with the problem of providing job opportunities for the older worker.

Two questions, obviously, are posed: one, what size labor force will be required in the decade ahead? Two, what will be the age composition of the labor force?

There is some tendency to assume away the first question by supposing that, given the level of economic activity generated by our rapid population growth, the aggregate demand for goods and services, and hence for labor, will be sufficiently high to absorb increases in the numbers of job seekers. A high rate of economic growth will admittedly minimize unemployment problems, and fiscal and monetary policies that induce a more rapid expansion in output are, of course, to be encouraged. But increases in the level of output, it must be remembered, can result from additions to the stock of capital goods as well as from additions to the number of workers utilized. In the recent past, in fact, productivity gains have permitted some industries to expand output substantially with little or no addition to employment.

The conclusion hardly needs emphasis: the labor force requirements of an economy undergoing rapid mechanization are likely to fall short of labor availability when the labor force is expanding in size. Measuring the extent to which labor availability will exceed labor requirements at some future date is, of course, difficult. Projections of the postwar trends by industrial sector, either of output per man hour or of value of total output, cannot be regarded as highly accurate. They provide rough estimates, nothing more. Moreover, the possibility of an increase in spending—associated with the missiles race, with some other exogenous factor, or with deliberate government economic policy—could easily render past trends valueless for predicting future developments.

But if past trends do in fact continue, they dictate the answer to the first question. It then becomes imperative that attention be directed toward the second question: what will the age composition of the labor force be? In terms of social policy, this question appears, at first glance, merely to be one of preference in the job market. But in a deeper context the question also involves important issues of resource allocation. To what extent, and under what economic arrangements, are the non-working members of society to share in the total output? Are inducements to be offered to younger persons to keep them in school longer, or are sufficient retirement benefits to be provided to induce older persons to retire sooner? Or will both policies be necessary?

In a decentralized economy, in which hiring decisions are made by individual employers, any particular choice between two job applicants may not be made exclusively on the basis of age. However, recent studies have indicated that many employers are reluctant to hire men over 45 years of age. What is perhaps more important from the point of view of older workers, the individual employer's willingness to retain persons past the usual retirement age of 65 has apparently been affected in recent years by the job needs of a growing number of younger men and by union pressure for mandatory retirement. Although particular firms, and even some industries, continue to retain workers beyond the age of 65, the general movement appears to be in the direction of compulsory, rather than voluntary, retirement policy.

The individual firm's retirement policy reflects the condition of gradually increasing unemployment, as well as intrafirm conditions such as business size, job skill, union and pension fund arrangements, etc. Our national policy, however, has partially answered the retirement question by specifying a uniform age at which workers are *eligible* for retirement benefits. The receipt of full benefits has further been made contingent on the worker's *actual* retirement from the job. The retirement test thus reflects an attempt to discourage older workers from full-time employment, an action that is understandable in an era in which jobs are scarce relative to the number of job seekers. In addition, the recent lowering of eligibility age for men underscores our need to reduce the size of the labor force.

Attempts to eliminate unemployment by measures designed to encourage earlier retirement are clearly futile. The problem of unemployment, if trends continue, will grow in significance, requiring increasingly bold use of monetary and fiscal measures. Nevertheless, the possibility that a growing percentage of the labor force will be unemployed suggests that the older person will be discouraged, by both public policy and business practice, from continued participation in the labor force. A gradual movement toward earlier retirement—retirement at age 60, perhaps—appears quite likely. But early retirement may be strongly resisted by the worker. Since our economy allocates income primarily to those currently engaged in production, there is great incentive to enter the labor force early and to retire late in life. Thus a rapidly growing number of adults are under pressure to enter and remain a part of the labor force in order to share advantageously in total output.

The incentive to be a member of the labor force could be weakened significantly by a change in the pattern of distribution of the national product. If a man's lifetime earnings were spread more evenly over his life span, rather than being concentrated in the working years, a different attitude toward labor force participation would surely evolve. To the extent that working persons save some of their current income, either individually or through voluntary or compulsory retirement plans, they help to even out the income stream. But the inducements to save for retirement have not been very strong; many workers, in fact, have such a great time preference for current goods and services that personal debt is often larger than personal savings.

The OASDI program helps to distribute current output between persons currently in the labor force and persons who have retired. An increase in benefits (financed by an increase in taxes) tends to even out the distribution of the product; it should thus have the effect of reducing the older person's inducement to continue work. In an era in which the amount of labor available exceeds the amount required, movements toward a more even distribution of income between the worker and the retiree should weaken the resistance to retirement.

By the same token, inducements might well be offered the younger person to stay out of the labor force, to remain in school for a longer period of time. Although no direct mechanism is available, such as exists for increasing retirement benefits, it would clearly be possible to provide subsidies to education and training programs, thereby offering the high-school graduate greater incentive to lengthen his period of job preparation. Reducing the labor surplus is only one of the laudable effects that such a program might have. Inherent in our predictions is the assumption that a sufficient amount of labor, equipped with the particular technical skills required by each industry, will be available. With sufficient funds and facilities and a time period long enough to complete the requisite training, such an assumption is permissible. However, if these conditions are not fulfilled, the unemployment problem will tend to grow in magnitude. It is quite possible to have particular labor shortages in the midst of an over-all labor surplus. Industries growing more rapidly than the national average are generally the ones that require a considerable amount of specialized training. Programs allowing people to acquire this training will help to prevent incipient labor shortages.

In both cases—improved educational opportunities for the young and improved retirement benefits for the old—the effect is to redistribute national product from the current labor force to nonworking members of society. Objections to such a redistribution would perhaps be minimized if it were clearly understood that this change might well increase the worker's total life earnings, as well as reduce the deprivation that often accompanies retirement.

In conclusion, an economy's ability to provide an adequate supply of goods and services to all members of society, whether or not they are currently employed in remunerative labor, is dependent, of course, on its productive capacity. When this capacity enables the economy to produce an abundance of goods with a declining proportion of its population in the active work force, society must decide which age group is to constitute the working group, or alternatively, whether a larger labor force will work fewer hours per week or per year. The drive for a shorter workweek may become more effective in time, particularly if unemployment increases.

Regardless of the decision concerning the age composition of the labor force, there remains the problem of providing income for those persons who are not currently employed. A solution to this problem necessarily involves some redistribution of the national dividend to younger persons not yet in the labor force, to older persons retired from the labor force, and to unemployed persons who are still members of the labor force. But whereas the issue of raising retirement income via the tax mechanism is a question of income allocation, the maintenance of full employment is a problem of inducing a higher level of output, which in turn can be distributed in whatever manner society chooses. Although one can make a case for income maintenance throughout the life span, rather than income maximization during the working years, it would seem unwise to rely on improved retirement benefits to induce a significant reduction in the level of unemployment.

The problem of income maintenance is discussed further in the last article in this volume.

Lloyd Saville

IV. FLEXIBLE RETIREMENT

A. SOME ECONOMIC CONSEQUENCES OF FLEXIBLE RETIREMENT

> *Venerable men! you have come down to us from a former generation. Heaven has bounteously lengthened out your lives, that you might behold this joyous day.* —D. Webster

Flexible retirement implies individual choice in at least two dimensions. It refers first to the option of working less than a normal number of hours each week and second to the selection of the time a pension will begin. In a limited sense the second of these became part of the federal social security program in 1956 when women were allowed to retire as early as age sixty-two if they wished,[1] and in a slightly broader sense when this alternative was extended to men in June, 1961.[2] The change affecting women was based primarily on the fact that the average age of wives was three years less than their husbands'.[3] The one affecting men was founded on the simple assumption that earlier retirement would reduce unemployment in the short run.[4] Both of these actions were taken without careful consideration of the over-all effects of flexible retirement on the economy.

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[1] Section 102, Social Security Amendments of 1956 (Public Law 880), Aug. 1, 1956. This followed by two years action under the Railroad Retirement Act to reduce widow and dependent parent eligibility from 65 to 60 years in 1954 and by 10 years woman-worker eligibility after 30 years of service to benefits at age 60.

[2] Section 102, Social Security Amendments of 1961 (Public Law 87–64), June 30, 1961.

[3] Statement of Representative Victor A. Knox corroborated by Mr. Robert Ball, Deputy Director, Bureau of Old Age Survivors Insurance, House Ways and Means Committee, *Social Security Amendments of 1961*, March, 1961, pp. 33–34.

Raising this issue at the present time is of some moment not only because of federal action, but also because students of several disciplines support divergent premises. From one camp comes the idea that stopping work before the conventional retirement age of 65 when employment contracts, old age benefits, and private pensions usually provide for payments to begin, may lead to individual or social gains. Working later may be psychologically and socially beneficial.[5] They suggest that the relatively declining number of workers caused in part by a longer educational period and in part by a greater longevity of the population requires the employment of more older workers just to maintain the proportionate size of the labor force.[6] From the other camp come equally articulate statements supporting a lowering of the general retirement age. Earlier pensioning permits the individual to enjoy extended leisure after a lifetime of work. It provides openings in positions of responsibility to be filled by younger persons. And it facilitates a reduction in the labor force made necessary by continued automation.[7] This paper examines certain available evidence relating to aged individuals, and even though the data are incomplete or at times ambiguous, attempts to put in some order the economic rubrics of the situation.

NUMBER OF OLDER PEOPLE

Potentially, the number of individuals intimately affected by flexible retirement is large. Presently, almost twenty-four million persons in the United States are 60 or over. Of these about 30 per cent are in the labor force. But, as shown in Chart 1, labor-force participation is a variable phenomenon. Retirement from it supposes that the individual is not seeking employment and, if employed, is working less than fifteen hours per week in a part-time job. As contrasted with this concept, flexible retirement may be broadly defined to include: (1) leaving the labor force at other than the normal retirement age, (2) limiting the hours worked to less than the standard amount, or even (3) shifting occupation to one less demanding. In most discussions only the first of these possibilities is contemplated.

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[4] President Kennedy's message, "Program to Restore Momentum of the American Economy," as excerpted in House Ways and Means Committee, *op. cit.*, p. 12. The stress here is on difficulties of older workers in areas of chronic unemployment re-entering the labor force.

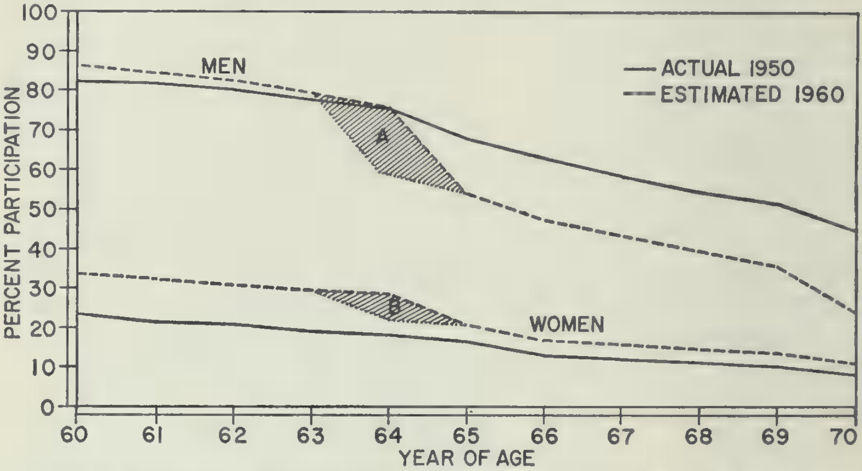
[5] For example, J. H. Britton, "The Personal Adjustment of Retired School Teachers," *Journal of Gerontology*, 8 (1953), pp. 333–338.

[6] See, for example, Thomas Phillips, *et al.*, *Report of the Committee on the Economic and Financial Problems of the Provision for Old Age*, Sessional Papers, 1954/55, No. 9333 (London, 1954), pp. 18–25, and reservation of A. K. Cairncross, pp. 86–90.

[7] Examples of this train of thought are notable in *Hearings before the Subcommittee on Problems of the Aged and Aging of the Committee on Labor and Public Welfare*, U. S. Senate 86th Congress, First Session, 1959, pp. 96–97 and 23–24.

During the past decade a progressively larger proportion of men at or beyond the conventional retirement age of 65 has been leaving the labor force while the number of women remaining at work has increased by perhaps one-third. Influence on retirement patterns of increased payments by private pension programs, expanded old-age benefits of the growing federal social security program, and possibly, greater adherence to retirement provisions in employment contracts is evident in Chart 1. The steeper slopes of the 1960 lines for both men and women between ages 64 and 65 reflect added retirements at this time.[8]

Chart 1. Labor force participation rates for men and women ages 60 to 70 in the United States, 1950 and 1960.



Source: U. S. Bureau of the Census, *U. S. Census of Population: 1950*, Vol. IV, *Special Reports*, Part 1, Chapter A, "Employment and Personal Characteristics" (Washington, 1953), p. 21, and *Employment and Earnings*, Nov. 1960 to Oct. 1961, p. 3.

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[8] No precise evidence is available concerning the number of workers leaving the labor force at ages near 65. Recently, the Bureau of Labor Statistics has begun to collect current labor force participation data for older persons on a year-by-year age basis. Because of the large sampling error and other random fluctuations, the Bureau is unwilling to release this information as yet. (Letter dated Nov. 30, 1961, code

Relevant for the present inquiry is the prospective effect of changes in the retirement age on the number of retirees. The kinks in the slopes of the broken lines in Chart 1 show the results of increased incentives to leave employment. A reduction of one year in the conventional retirement age with all of its complex economic, legal, and social sanctions relating to public and private pensions, union rules, personnel policies of private industry, and individual status may be visualized as removing from the labor force the men represented by area A. On this assumption most men would remain at work as they do now, but about 16 per cent more of them would be induced to retire in their sixty-third year. In the case of women, shown as area B, about 6 per cent would be involved. In total, these amount to an estimated 150,000 workers at the 1960 level of population. If the retirement age were increased instead of lowered, a somewhat smaller shift could be anticipated.

Extending the scope of the change by moving the conventional retirement age to 60 or 70 would in either case affect perhaps one-half million persons. Even projecting these changes into the future, say to 1975, might produce only a modestly greater impact. For if current participation rates and a seventeen million labor force from the age group 60 to 69 are anticipated,[9] a movement of the conventional age five years in either direction at that time might result in no more than three-quarters of a million persons leaving or re-entering the labor force.

Why is the influence of the retirement age so small? Three explanations may be explored: variation in the general level of employment,

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no. 322). Furthermore, the Bureau of Census currently has no funds available for tabulation and publication of 1960 data in this detail. The estimates shown in Chart 1 are consistent with current statistics of five-year age groups and collateral evidence of the number of workers currently receiving old-age benefits. ("Annual Statistical Supplement, 1959," *Social Security Bulletin*, 23 [1960], p. 28).

[9] By 1975 it is estimated that the population aged 60 and over will number some thirty-one million persons. Although the actual number does not, of course, vary with fertility assumptions, its relative importance does change somewhat. By a high assumption of fertility, say 10 per cent above the 1955–57 level throughout the period, those aged 60 and over represent 12.9 per cent of the projected total population. A low assumption of fertility, a decline from the 1955–57 level to the 1942–44 level by 1965–70 and then constant, implies an amount equal to 14.6 per cent. Between the two there is a difference of 1.7 percentage points. In the case of the older age group, age 70 and over, the range is even smaller, between 5.8 and 6.5 per cent respectively. (Meyer Zitter and Jacob S. Siegel, "Illustrative Projections of the Population of the United States, by Age and Sex, 1960 to 1980," *Current Population Reports, Population Estimates*, Series P-25, No. 187 [1958], pp. 16–21.) As is customary, the usual assumptions of no disasters to the population, such as major wars, epidemics, or other catastrophes, no major economic depression, and no runaway inflation are continued throughout this essay.

modification in the eligibility rules for pensions, and decline in income associated with retirement.

No significant relationship between the level of unemployment and the retirement age is apparent from the available statistics. Some rather ambiguous evidence of average amounts of unemployment and average ages at retirement are juxtaposed in Table 1. The unemployment data relate to all men and women in the civilian labor force. Retirement figures are in reality "entitlements" to draw old-age benefits under the social security program. As such, these later series represent virtual but not complete coverage and "certification" of eligibility rather than retirement itself. Apparent inverse correlations between the two series stem from concurrent declines in ages and increases in unemployment over the period. Furthermore, even

Table 1. Average Age at Entitlement for Old-Age Benefits under the Federal OASDI Program and Percentage of Unemployed in the Civilian Labor Force

	Men		Women	
Year	Average age at entitlement	Per cent unemployed	Average age at entitlement	Per cent unemployed
1946	69.5	4.4	68.7	2.8
1947	69.1	3.7	68.6	3.2
1948	68.9	3.6	68.5	4.1
1949	68.6	5.9	68.3	6.0
1950	68.7	5.1	68.0	5.8
1951	69.2	2.9	68.2	4.4
1952	68.6	2.8	68.2	3.7
1953	68.6	2.8	68.2	3.3
1954	68.0	5.3	67.6	6.1
1955	68.4	4.2	67.8	4.9
1956	68.4	3.8	66.2	4.9
1957	69.0	4.1	66.2	4.7
1958	67.9	6.8	66.1	6.8
1959	67.2	5.3	65.6	5.9

Source: "Annual Statistical Supplement, 1959," *Social Security Bulletin*, 23 (1960), Table 27, and U. S. Bureau of the Census, "Employment Status of the Noninstitutional Population, by Sex," *Employment and Earnings*, 8 (1961), July, p. 2.

Comparable unemployment rates for the age group sixty-five to sixty-nine are available for a few years:

Year	*Men*	*Women*
1957	3.7	4.0
1958	6.8	4.2
1959	5.6	3.4

"Annual Supplement 1954–59," *Employment and Earnings*, 6 (1960), May, p. 82.

from the somewhat more pertinent information available for the years 1957 through 1959 (shown in the note on Table 1), no general inference is possible. Although older women show substantially lower unemployment rates than women as a whole, men show lower, equal, and larger amounts. Thus, part of the reason for the inconclusiveness of these findings is the result of shortcomings in the data, part also from the possibility that other pressures than unemployment may be more generally effective in influencing the retirement age.

Changes in eligibility rules for pensions do produce numerical evidence of some value. As qualifications for public pensions are reduced, for example, the average age of those receiving payments is also reduced. This result arises apparently not from the retirement of persons currently working or seeking work, but rather from the new eligibility of persons not in the labor force at the time. Some statistical evidence of this is found in a comparison of the data for women in Chart 1 with the reductions in average retirement age shown in Table 1. Women aged 60 through 70 showed higher participation rates for each age in 1960 than in 1950. During the same period the average retirement age declined by two and one-half years. Part of the reason for this was the liberalization of the retirement test during the decade which increased the attractiveness of part-time employment after retirement had been achieved. Part also may be explained by the preference of some women to maintain virtually full-time jobs well beyond the conventional retirement age. Thus the effects of both varying employment conditions and liberalizing benefit provisions are clouded by a number of relevant variables included in the available time series. More concrete evidence is found concerning income levels.

INCOME IN RETIREMENT

Retirement spells major income loss. Some recent details regarding age groups 55 to 64 and 65 and over derived from the Current Population Survey of the Bureau of the Census are shown in Table 2. Average incomes of persons holding full-time jobs are compared with average incomes of individuals not in full-time employment. Excluded from these figures are people who receive no income. Among the men only about 3 per cent in the two age groups are in this category while among the women almost one-half of those 55 to 64 receive no income, while as pension and survivor benefits become more widely available only one-quarter of those aged 65 and over are in this situation.

Both men and women receive about half as much income in retirement as they did when working full time. Pulled upward by a few high incomes, the arithmetic mean values in Table 2 tend to be larger than the median amounts derived from the same data. As is usual in populations of this sort, the middle income may be from several hundred to as much as a thousand dollars smaller than the mean. Thus the median income for men workers in the younger group is five thousand dollars and for women thirty-two hundred. As a result of a lower response rate from persons in higher income groups, there is some understatement of the amount of income included in the survey. Because of inadequacies in the original data, insufficient information to compute medians in each case, and need for mean values in the subsequent analysis, severely rounded arithmetic means are presented.

Table 2. Mean Incomes of Older Persons Receiving Income According to Employment Status in the United States, 1959

	With full-time employment	Without full-time employment
Men		
Age 55 to 64	$6,000	$3,300
Age 65 and over	4,800	2,000
Women		
Age 55 to 64	3,500	1,500
Age 65 and over	2,900	1,100

Source: U. S. Bureau of the Census, "Income of Families and Persons in the United States: 1959," *Current Population Reports, Consumer Income,* Series P-60, No. 35, 1961, p. 38 and supplementary distributions made available by the Bureau in a letter dated November 27, 1961. Because of the nature of the original data the means of the class intervals in the frequency distributions were determined by use of a Pareto curve.

Clearly, full-time work is much less rewarding among those 65 and over than it is among persons in the age class 55 to 64. This follows the general pattern of income-age data which display a peak for men in the age group 35 to 44 and for women in the next earlier age class, 25 to 34.[10] From age class to age class throughout the middle range of this distribution, declines in average income from the peak are modest; at either end of the distribution, for both the young and the old, reductions in income are large.

Paralleling the decline in income of employed persons are similar declines among those not employed on a full-time basis. This phenomenon may be attributed to the selective operation of the retirement process. Leaving the labor force may be conditioned in part by the availability of income in retirement. This would help to explain the lower average income of men and women with full-time employment in the older age class in Table 2. Also, as people with lower retirement incomes eventually leave the labor force they tend to draw down the average level of income in retirement. In addition to these effects are others tending to reduce the incomes of older persons; among them the persistent lowering of capacity for work is of major importance. Thus, even though reasons of health and automatic retirement policies account for the majority of retirements, in many cases the very magnitude of income decline associated with the ending of gainful employment serves to restrict retirement to those who can afford to retire.

INCOME SOURCES OF THE AGED

In the age group 65 and over, employment is still the most common source of income. It is larger even than the total from both social insurance benefits and public assistance payments combined. Table 3 shows a percentage distribution of various sources in 1950 and 1960 ranked according to importance in the earlier year. The high position of returns on property in the form of interest, dividends, and rent contrasts the relatively low standing of incomes derived from private pension plans and individual annuities.

Removing employment income from the 1960 figures emphasizes the significance of the Old Age and Survivors Disability Insurance program, which accounts for almost two-fifths of the remaining total. If the other public programs—assistance, railroad retirement and government employees, and veterans categories—are added to this one, the total amount provided by government plans accounts for three-fifths of the total (less employment income). On this same basis the 5 per cent shown for private pension plans and individual annuities in Table 3 still accounts for less than one-twelfth of total income. Because of the concentration of income sources in the two areas the subsequent analysis is simplified to include mainly employment and social security.

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[10] U. S. Bureau of the Census, *Current Population Reports, Consumer Income*, Series P-60, No. 35, "Income of Families and Persons in the United States: 1959" (1961), p. 38, and White House Conference on Aging, *Background Paper on Income Maintenance* (Washington, 1960), pp. 76–77.

Aggregate income of persons aged 65 and over doubled between 1950 and 1960. But the number of these people increased by almost one-third, and the value of the dollar decreased by about one-quarter. Therefore, in real per capita terms the improvement was an unspectacular one-tenth. There are several reasons for this at a time when the increase for the general population in the United States was almost double this amount. (1) Substantially fewer in the aged group were employed on a full-time basis. (2) A larger proportion of the group were women who had never worked. (3) Both public and private pension programs expanded greatly. This permitted, and in some cases literally required, numbers of the aged to retire on reduced incomes rather than to continue employment at somewhat higher wage and salary levels. And, (4) once retirement was achieved, income sources tended to be less responsive to inflationary pressures than those derived directly from employment.

Table 3. Percentage Distribution of Estimated Income Sources of Persons Aged 65 and Over in the United States, 1950 and 1960

Source	1950	1960
Employment	50	33
Property income (interest, dividends, rent, etc.)	29	20
Public assistance	9	6
Railroad retirement & govt. employees (local, state, & federal)	4	6
OASDI	3	26
Private pension plans & individual annuities	3	5
Veterans	2	4
Total	100	100

Source: Developed from Lenore E. Epstein, "Money Income of Aged Persons, Mid-1960," *Social Security Bulletin*, 24 (1961), pp. 12–17 and "Background Paper on Income Maintenance," *White House Conference on Aging* (1960), p. 7.

In the future, employment and property income, as well as the many forms of public assistance, will probably continue to decline in relative importance, but this may proceed at a slower rate than has occurred during the past decade. Surely the chief variable in Table 3, the expansion of OASDI coverage by five-fold, can hardly be matched again. Earnings from employment by, say 1975, may still be the most important single source of income for these individuals. With retirement, however, public programs assume pre-eminence. In this situation not only the maintenance of demand of the retired group, but also the financial feasibility of retirement itself appears to rest on government-sponsored programs, notably the OASDI.

Since the federal government will probably play a major role in providing retirement income and the government has begun a program of flexible retirement, it is pertinent to ask: What are the probable economic effects of the development of this program in the future? Some aspects of this question are examined below, under conditions of both full and less-than-full employment.

FLEXIBLE RETIREMENT WITH FULL EMPLOYMENT

General adoption of flexible retirement could influence the economy in a number of ways. Beyond its direct effect in changing the size of the labor force, it might also produce alterations in several economic variables. Three of these—income, welfare, and productivity—are examined briefly under conditions of full employment.

The Income Effect

An approximation of the influence of flexible retirement on total personal income may be attempted. To accomplish this, three basic assumptions are necessary: an estimate of the segment of the labor force involved, an approximation of the average income from employment, and a notion of the mean income in retirement. Based on these, some idea of the financial impact of changes in the retirement age may be obtained.

A latent assumption maintained thus far has been the reversibility of changes in the retirement age. A more sophisticated view suggests that increasing the retirement age by one year produces a somewhat different immediate effect from reducing it by one year. Persons in the age class 60 to 64 are distinguished from those in the class 65 to 69. They are characterized by age, yes, but also by the conditioning of many in the older group to retirement. Among the group aged 60 to 64, four-fifths of the men and one-third of the women are in the labor force (Chart 1). In the group 65 to 69 these proportions have dropped to about one-half of what they were to become: roughly two-fifths for men and one-seventh for women.

Except, perhaps, for their expectations, any increase in the present retirement age would have no influence on the younger group. Conversely, a reduction in the retirement age below 65 would mean a movement from the labor force of many men and women in the affected ages. In the case of the older group a change in the retirement age would make less impression. Among them there are fewer gainfully employed. Also, many actually classified in one series of statistics as "retired," by virtue of the fact that they draw pension benefits, are identified in another series as members of the labor force because they work at least fifteen hours per week in part-time jobs.[11] A second factor restricts change in this older age group. Both the desire and the capacity to work are prerequisite to seeking employment. Thus, given the present relative levels of pension benefits and employment incomes, increasing the retirement age from its present standard might influence few workers to re-enter the labor force.

Reducing the retirement age is a different matter. As estimated from Chart 1, about 150,000 workers would leave the labor force if the conventional retirement age were reduced by one year. Reference to Table 2 shows a difference in income between persons with and those without full-time employment averaging almost twenty-five hundred dollars per year for men and women. The product of number of retirees and loss of income gives the total loss to these individuals associated with dropping the retirement age by one year, about three hundred million dollars.[12] And, roughly, double this amount is lost to the economy as a whole since, under the prevailing assumption of full employment, the total product of these individuals is withdrawn. Approximate as these figures are, they do give some general notion of the scope of the problem in income terms. Moving the conventional retirement age back to sixty and even allowing for some understatement in income estimates might produce a change in national income of perhaps two billion dollars, or less than 1 per cent of the total.[13] Although in aggregate terms this entails a drop in production for the economy as a whole, the loss is a special burden to the older age group, where income reductions are severe.

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[11] It is true that unemployment tends to be more severe at both younger and older ages. Discussion here, however, is under the assumption of full employment. Furthermore, because of the degree of unemployment at the younger ages, those at the older ages in recent years have almost always lower ratios than the population as a whole. ("Annual Supplement, 1954–59," *Employment and Earnings*, 6 [1960], p. 82.)

[12] Computed from original data prior to rounding.

The Welfare Effect

Beyond the direct income effect there is a welfare effect as well. Evidence of this tends to be found only indirectly in wage and related data, and more specifically in the hours of work and in job shifts associated with older workers. Thus not all of the results of changes in the retirement age can be measured in terms of money income. Consideration needs to be given also to the utility derived directly from the ability to alter the number of hours worked and the nature of the job, in addition to the fact of employment itself. Reducing the workweek and moving to less strenuous employment are two facets of flexible retirement. The example of the semi-retired individual who is working in a department store just during the rush hours each day is matched by the example of the weaver in a cotton mill who is moved to a guard post when he is no longer able to tend the machines. In this way welfare distribution may be improved by a more accurate satisfaction of the individual's wants and capacities.

Part-time employment produces statistical evidence of the adjustment of individuals and businesses to their mutual needs. Chart 2 shows the typical U-shaped distribution encountered when part-time employment is plotted against age. The evidence that a substantially larger proportion of older workers do in fact engage in part-time employment than persons in any but the youngest group suggests satisfaction of a widespread need for this class of worker and this class of employment.

Although labor turnover rates of older workers tend to be low, job turnover may be high. Because of the difficulty of finding new employment, mature men and women tend to maintain affiliation with the same company.[14] This produces a low labor turnover rate. However, their declining capacity to perform, especially in repetitive, piece-rate jobs, frequently dictates their transfer to less difficult assignments.[15] The availability in this situation of such aspects of flexible retirement as shorter hours, part-year employment, less demanding work, and either earlier or later pensioning all tend to result in an improved welfare distribution.

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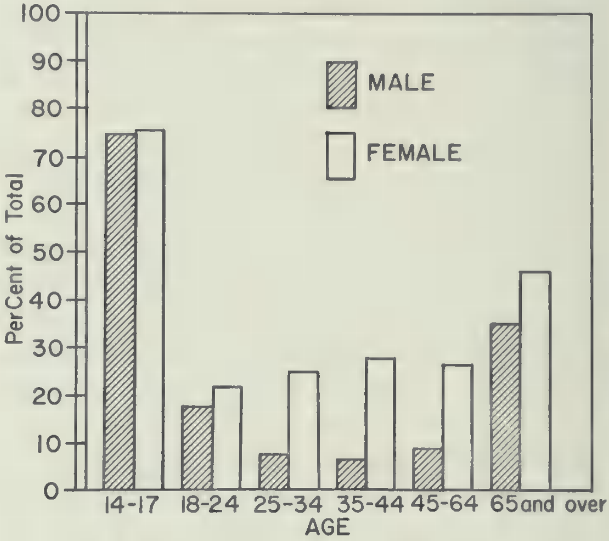
[13] Chart 1 and U. S. Department of Commerce, *Survey of Current Business*, 41 (1961), p. 10.

[14] Jane L. Meredith, "Long-Term Unemployment in the United States," *Monthly Labor Review*, 84 (1961), pp. 601–610.

Chart 2. Percentage of male and female workers in selected age groups in part-time employment, June, 1961.



Source: U. S. Bureau of Labor Statistics, *Employment and Earnings,* 8 (1961), July, p. 10.

The Productivity Effect

Two parts of this topic may be considered, the influence of capital equipment and the influence of acquired skills. Regarding the first of these the evidence is clear. It follows from the general corroboration of the consequence of a growing population on existing resources and capital equipment. Experience in the United States during the past half century suggests that additions to the labor force have tended to limit the rate of growth of the capital-labor ratio.[16] In this same way any current labor force expansion resulting from later retirement would tend to decrease the ratio, while any labor force curtailment from earlier retirement would tend to increase it. Thus the increased input of labor resulting from population expansion and later retirement by lowering the prevailing depth of capital plant and equipment may dissipate its labor factor gains in lost efficiency.

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[15] U. S. Bureau of Labor Statistics, *Job Performance and Age: A Study in Measurement,* Bulletin No. 1203 (1956), especially p. 1.

[16] See the general discussion of the role of population in J. J. Spengler, "Population as a Factor in Economic Development," in P. M. Hauser (ed.), *Population and World Politics* (Glencoe, Ill., 1958), p. 174, and the charts shown by Moses Abramovitz, "Resources and Output Trends in the United States since 1870," *Papers and Proceedings of the American Economic Association,* 46 (1956), pp. 16–19.

Concerning the second aspect of the topic, the influence of acquired skills, a similar but less definite conclusion is appropriate. Table 4 summarizes the findings of a detailed study of over two thousand production workers in eight establishments. In only three of sixteen job classifications were statistically significant differences discovered for the two extreme age groups. This underscores the difficulty of generalizing in this complex area. Concerning the results as a whole the investigators concluded: "In the case of *output per man-hour,* the data showed, in general, a stable average performance level through the age of 54, with some falling off occurring in the average for the 55–64 year group. . . . Variations in the output of persons in the same group were very large—in fact, they were greater than the difference in average output among age groups." [17] This suggests that in production work, where simple skills are

Table 4. Relative Output per Man-Hour in the Youngest and Oldest Age Groups of Pieceworkers in Four Footwear and Four Clothing Establishments, 1955

	Footwear, machine operations	Clothing, hand operations
Male		
Higher paid occupations	Y	n.s.
Lower paid occupations	O	n.s.
Female		
Higher paid occupations	n.s.	n.s.
Lower paid occupations	n.s.	Y

Abbreviations:
O = Older group, aged 65 and over, showed a significantly higher output per man-hour.
Y = Younger group, under 25, showed a significantly higher output per man-hour.
n.s. = Insufficient observations.

Source: U. S. Bureau of Labor Statistics, *Job Performance and Age: A Study in Measurement*, Bulletin No. 1203 (1956), pp. 34–35.

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[17] *Job Performance and Age,* pp. 34–35.

quickly learned, older workers who spend lifetimes in these occupations are on the average at a disadvantage in comparison with younger competitors.

Two qualifications are suggested by these findings. A selective process is at work overtime in removing both the poorest and the best workers from each semiskilled job classification. In addition to this, the range of skills within each group continues to be greater than the difference among age groups. Because of these and other influences, each new worker with greater energy and more stamina than the older worker he replaces tends to raise the average efficiency of the working population. But each new worker with less experience and less know-how than the older skilled worker who has advanced beyond the simple repetitive job level tends to reduce the average efficiency of the working population. This implies that later retirement, permitting older, more skilful workers to stay in the labor force longer, tends to increase the efficiency level. In sum, the weights of the counteracting forces of the young and the old seem to balance one another. Some edge toward improved productivity is provided by the market mechanism as it moves the less skilled into part-time work and early retirement, and holds the higher skilled in full-time employment. Offsetting the market mechanism is the economic feasibility of persons with higher income, and so presumably with higher skills and greater pension accumulations, leaving gainful employment at an earlier age than those with lower incomes and skills.

Given a constant population, the two conflicting influences on productivity tend to offset each other. As the retirement age is reduced, fewer skilled workers have the use of more capital equipment; as it is increased, more numerous skilled workers have the use of relatively less equipment. In either case, a virtual balancing of tendencies may be imagined with some preference being given to the prospective gains from earlier retirement.

Under the assumption of full employment, income loss would seem to be the chief cost of earlier retirement both to the pensioner and the economy. If the more realistic view of a continually expanding population is added, then the income loss associated with earlier retirement would tend to be offset by the relative gain in productivity as relatively fewer workers were applied to a slowly growing capital plant. Removing the simplifying, full-employment assumption serves to cast these effects in somewhat different perspective.

FLEXIBLE RETIREMENT WITH LESS THAN FULL EMPLOYMENT

In the Short Run

Does banishing the full-employment assumption alter the conclusions? In a sense, yes, since transfer payments assume greater moment in approximating an answer. Although these tax remittances, bond purchases, and associated contributions by one group and the corresponding unemployment compensation, retirement benefits, and pension allotments to another group take place under conditions of both full and less-than-full employment, their relative importance to the economy may differ.

With full employment, persons entering or leaving gainful employment increase or decrease the labor factor and, *ceteris paribus,* produce an expansion or contraction in the national product. In this situation the change in transfer payments usually produces a smaller impact since it arises from differences in saving and consumption schedules of the providers and receivers involved in the changes in transfer sums.

With less-than-full employment, however, the entrance or exit of new persons into or out of the labor force may be thought of primarily as swelling or reducing the number of unemployed and retired individuals, and so would have little direct influence on the size of the labor factor of production or the national product. At the same time, unemployment and retirement compensation may change and hence transfers may be altered appreciably. Thus transfer payments assume a more significant place in the less-than-full employment analysis.

In examining the problem a simplification of the situation may be used to illustrate the magnitude of the forces involved. Just three general examples of wage earners may be stipulated to include the spectrum of possible cases. In the first, the worker who is forced to retire instead of being laid off is not replaced. In the second, he is replaced from the ranks of the unemployed drawing insurance benefits. And in the third, he is replaced by a new entrant into the labor force. Since all states provide a maximum of at least twenty weeks of unemployment benefits, the short run may be stipulated to conform to this period.[18]

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[18] Saul J. Blaustein, "The Challenge Facing the Unemployment Insurance System," *Monthly Labor Review,* 84 (1961), p. 244.

In the first case, the effect on the income of the individual depends upon the relative levels of benefits received by persons in retirement contrasted with wages previously received in employment. On the basis of the estimates used in the previous section, each retiree who was not replaced would, on the average, lose twenty-five hundred dollars per year in income. In the second example, the effect on the income of the two workers may be assumed to depend on payments from unemployment insurance and from old age benefits. Table 5 shows the general levels of coverage from these two sources. The data suggest that earlier retirement may provide substantially lower income than unemployment compensation, especially if it takes place prior to age 65 when benefit payments are perceptibly smaller.[19] Thus, in the first two examples an adverse effect on the income of the older individual is clearly evident.

Table 5. Benefits of Unemployment Insurance Program of the States, and Old Age Benefits of the Federal Social Security Act, January, 1961

	Unemployment Insurance	Old Age Benefits
Maximum benefit per week	$26 to $57	$27*
Average weekly benefit	$34	19*
Duration	20 to 39 weeks plus extensions	Lifetime

Source: Saul J. Blaustein, "The Challenge Facing the Unemployment Insurance System," *Monthly Labor Review*, 84 (1961), pp. 242–249; U. S. Department of Health, Education, and Welfare, *Social Security Bulletin*, 24 (1961), p. 35 (Table 4); and U. S. Bureau of Labor Statistics, *Monthly Labor Review*, 84 (1961), p. 432.

* Proportionately less would be paid at retirement prior to age 65 if present actuarial adjustment were used.

What is the effect on total income? In the first case the income in question is of two sorts. While employed prior to retirement the individual receives income in exchange for his contribution to gross national product. After retirement or while unemployed he receives income not from gainful employment as he did before, but as transfer payments from others in the form of old age benefits or unemployment compensation. Thus, the retirement of the worker in the first case who is not replaced means a loss to the economy of his whole working effort and an increase in transfer payments by the amount of his retirement income. In the second case, assuming equal productivity of both the worker retiring and the worker replacing him, national product remains unchanged and transfer payments are reduced by the amount of the difference between retirement benefits and unemployment compensation.

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[19] These cases are based on retirement from gainful employment and exclude the somewhat nebulous retirement from unemployment. In this situation income loss in the short run when unemployment compensation is available would correspond to the second case.

There is still a third situation to be considered. This concerns the replacement of the retired worker by a new entrant into the labor force. Assuming that the new worker produces and receives fully as much as the man he replaces, the new worker increases his income by the full amount of the wage while the retired worker loses roughly half of this income. The economy as a whole suffers no change in national product but there is an increase in transfer payments by the amount of the pension. Clearly, the first case is the one to be avoided most vigorously since the individual loses income and the economy loses product.

In the Long Run

An accumulation of a hard core of individuals for whom unemployment benefits have expired and the presence of a number of young new entrants unable to find work characterize the less-than-full employment situation in the long run. Of the variables influencing the future course of this predicament, two are of critical moment. The first of these is the degree to which automation is adopted. Recent studies foresee a continued relative reduction in manpower needs, especially if advanced techniques are introduced generally and featherbedding is avoided. The second results from increases in the population. Having passed the peak of its initial influence on demand, the population explosion may soon exercise a moderating tendency on the economy as postwar babies become a part of a relatively expanded labor force. In sum, the first of these factors will tend to reduce the demand for labor, the second will tend to increase the supply. Will flexible retirement serve to reduce this superabundant labor force?

Use of an example is again appropriate. In this situation, however, only the third case is applicable. The first is ruled out because the redundant older worker would be retired; conditions in the long run preclude maintaining key employees or others not permanently needed. The second is excluded because unemployment benefits are no longer available. This leaves the third case in which a new entrant into the labor force or, now, an individual who has exhausted his unemployment benefits, replaces the retiring worker.[20] In this situation, as in the short run, the retiring worker loses about half of his income, the newly employed worker gains the full amount of the income, the national product remains unchanged, and transfer payments are increased by the amount of the pension.

Of what moment are these shifts in income and transfer payments? Older persons generally use "on the average a greater proportion of income on food, drugs, and home improvement materials," while younger persons "buy more appliances, automobiles, furniture, and housing than the average for all ages." [21] To the extent that this is true, the replacement of older workers with younger ones results in a shift in demand towards durable goods and away from the services sector.

But is it age that is most important in determining consumption patterns? As concluded by Goldstein: "When income and an additional variable are held constant, the general tendency has been for the differences in consumption expenditures among the age groups to become less patterned and for the aged not to have a uniquely different pattern of consumption from that of some or all of the younger groups." [22]

Spending practices in Table 6 exhibit this phenomenon. Shown in adjacent columns are percentage distributions of expenditures of families in the same income classes but with heads of household of different ages. Because of inherent variables in the data, such as family size, tenure status, sex of the head of the household, and race, the evidence is not entirely unambiguous. In a majority of these expenditure categories, however, the differences between income classes are greater than between age levels. Likewise, when average expenditures are examined for these categories, similar and because of the magnitude range even more impressive results obtain. As families mature, decline in size of personal income brings about more pronounced shifts in consumption patterns than the simple fact of aging.

A moot question arises: Should the income of the retired be supported by public and private means? If it is, consumption expenditures will be maintained, but transfer payments will be increased. The classic importance of these payments may be reviewed in simple terms. Receivers of transfer payments such as the unemployed and the retired tend to realize low incomes, to have a greater propensity to consume, and to concentrate expenditures in the nondurable goods sector. On the other hand, the providers of transfer funds may be thought of as having lower propensities to consume, especially as far as the alternative uses of marginal tax payments and bond purchases are concerned. Thus a shift of transfer funds from the second group to the first would imply an increase in the over-all propensity to consume and a relative expansion of demand in the soft goods and the services sectors. Such effects as these would constitute an immediate gain by the narrow criterion of employment alone.

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[20] To simplify this analysis the possibility of a retired individual drawing both unemployment and retirement benefits at the same time is disregarded.

[21] Otto Eckstein, *et al., Staff Report on Employment, Growth, and Price Levels,* Joint Economic Committee, 86th Congress, 1st Session, 1959, p. 80.

[22] Sidney Goldstein, *Consumption Patterns of the Aged* (Philadelphia, 1960), p. 282.

Table 6. Distribution of Consumption Expenditures by Family Units in Modal Income Classes for Two Age Groups of Heads of Household, 1950

	Income Class $1,000 to $2,000		Income Class $3,000 to $4,000	
Expenditures	Age 55–65	Age 65–75	Age 55–65	Age 65–75
Food	33.6	36.8	31.9	31.8
Housing & household operation	27.5	28.7	20.4	22.8
Furnishing	5.0	4.3	6.0	7.1
Clothing	7.8	6.8	10.2	9.2
Transportation	8.9	6.2	12.0	11.2
Medical care	5.4	6.7	7.0	7.1
Personal care	2.4	2.1	2.4	2.0
Recreation	2.3	2.0	3.6	3.3
Reading materials	1.1	1.1	1.0	1.0
Alcohol	1.4	1.6	1.6	1.1
Tobacco	1.9	1.5	1.8	1.4
Education	0.1	0.1	0.4	0.3
Miscellaneous	1.7	2.0	1.5	1.7
Total Per Cent	100.0	100.0	100.0	100.0

Source: Sidney Goldstein, *Consumption Patterns of the Aged* (Philadelphia, 1960), pp. 67, 85, 103, 119, 135, 151, 163, 172, 185, 190, 192, 194, and 196. Because of rounding, totals do not necessarily equal 100.

In terms of achieving a viable economy and accelerating economic growth, however, other effects assume eminence. If tax and premium increases are not adequate to provide the sums needed for pensions, such devices as increasing bond sales through higher interest rates and liquidating investments by bargain prices might be attempted. But such eventualities as higher interest rates and lower prices tend to retard rather than stimulate growth and so work to vitiate the goal of a progressive and expanding economy.

TOWARD A PUBLIC RETIREMENT POLICY

In spite of the inelegance of the data and the need to rely on the outlines of the situation, an attempt is made to estimate the appropriate place of flexible retirement in the United States today. Since retirees already share proportionately less in material gains than the total population, a policy aimed at inducing them to bear a further income loss by earlier retirement seems less than equitable. Increasing employment opportunities for younger individuals might be accomplished less objectionably by this device if pensions of those retiring earlier were increased so that no economic loss were suffered. Such a policy, however, might involve a large and perhaps unnecessary increase in the government's role in the social sector. The cost of such a program would be substantial. To lift current benefits of all retirees to, say, two-thirds of preretirement levels, assuming average retirement at 67 as at present, might involve additional annual income payments of perhaps ten billion dollars. If *everyone* retired at sixty, this would increase to as much as thirty-five billions, or 9 per cent of total personal income. By 1975 this value might have swelled, roughly, to 13 per cent.[23] And this is not the entire cost: the complex problem of enlarged transfer payments and associated contingencies of financing larger pensions may tend to retard economic growth.

Recent expansion of both population and automation dictates massive national action in providing a more general solution to the employment problem. Since flexible retirement would place responsibility for such action on too narrow a segment of the total population, other, broader methods should be developed. The strength of flexible retirement lies primarily in its ability to adjust the individual's capacity to his working environment. Accordingly, this theme would be paramount in fitting it into the context of a public retirement policy.

Maximum use of the market mechanism is suggested. In this way more highly skilled and dedicated workers could be held in the labor force by job opportunities, while lower skilled and less interested workers were moved to retirement. Degrees of retirement as well as freedom of re-entry into the labor force after initial retirement should be commonplace, so that finer adjustments of individual and social needs might be attained. Finally, government action to advance or retard retirement in order to adjust the size of the labor force, since it involves substantial collateral problems, should be attempted only when other methods fail. Even then it should be provided equitably by changes in income payments sufficiently large to motivate the movement of workers in the desired direction.

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[23] Chart 1, Table 2, and Zitter and Siegel, *op. cit.*, pp. 16–21.

Gains accruing from this policy might include: some rise in the level of satisfaction as needs and capacities to work were more closely meshed, some improvement in the level of skill of the labor force as the market mechanism tended to weed out the less skilful and to keep at work the more skilful, some moderation of the issues of added government involvement and expanded transfer payments as the additional pensions of those retiring earlier were balanced by the deferred pensions of those working later, and some increase in the resiliency of the labor force as both market and public actions called forth changes in the number of gainfully employed.

This is no answer, as indeed it should not be, to the basic problems of maintaining an acceptable rate of economic growth, achieving a high level of employment, or controlling a burgeoning population. Perhaps the greatest gain of a flexible retirement program lies not in its role as a palliative for more fundamental ills, but in its capacity to increase the freedom of the individual to adapt himself to his economy on "this joyous day."

Lloyd Saville

IV. FLEXIBLE RETIREMENT

B. FLEXIBLE RETIREMENT ABROAD: A PRELIMINARY ESTIMATE

> *As economic cares migrate from the private to the public sphere, many urges that favor this migration become satisfied, wholly or partly, so that the tendency may lose momentum.* —Schumpeter, "The March into Socialism"

Older persons seem to share less well in income advances than the population as a whole. Part of the reason for this is the lower capacity of the average older worker. Part is the sizable income loss marking the shift from employment to retirement. Part, too, is the effect of creeping inflation on relatively fixed incomes. As a result of these influences not only do income averages decline sharply with age and respond less quickly to changing economic conditions, but also aggregate consumption tends to shift toward the soft goods and services sectors.[1]

In most of the sixty-odd nations of the world supporting social insurance programs, public pensions provide the largest proportion of retirement income. In the United States for example, where private pension plans flourish, property income is of some importance, and Social Security has scarcely come of age, almost two-fifths of the retirement income of persons aged sixty-five and over is derived from the federal social insurance program and some three-fifths of such income arises from government programs as a whole.[2] Since national policy now plays such a strategic role in providing retirement income, the ensuing discussion will be concerned primarily with public programs.

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[1] For an elaboration of this introductory section see the author's "Some Economic Consequences of Flexible Retirement," in this volume. It is assumed that pension benefits from governments involve transfer payments from higher to lower income groups and so produce shifts in expenditures toward the soft goods and services sectors of the economy.

Flexible retirement enables the individual to select the time he will leave gainful employment and begin receiving pension payments.[3] Beyond this, it may augment or erode individual income, influence saving and investment schedules, produce shifts in consumption patterns, and involve the government more or less deeply in capital markets. The purpose of such a program may be designed to increase or to decrease the size of the labor force, to adapt working arrangements to the needs and capacities of older persons, or even to enlarge the individual's freedom of choice in the economic sphere. To the extent that flexible retirement means later retirement it usually results in a larger pension when retirement is finally begun. Thus, the older individual's income is maintained at a higher level and the shift in aggregate consumption from the hard to the soft sector associated with retirement is reduced. Also, not only is the amount of labor available as a factor of production enlarged and the current cost of pensions reduced, but also the secondary effects of financing increased pensions are avoided.

To the extent that flexible retirement means earlier retirement, the reverse of these effects ensues. The individual usually suffers an earlier loss of income and a lengthening of the fixed income period. In addition, the economy experiences a shift in total demand toward the soft goods sector. Furthermore, the use of alternative devices to help finance the higher cost of earlier pensions beyond actuarially determined premiums may bring about increases in taxes, higher interest rates, and greater inflationary pressures—effects generally considered inimical to economic growth and development. Thus flexible retirement may be adopted to remove one of the frictions in the market and so provide for a better resolution of economic and social forces. Selected as a means of raising or lowering the general retirement age it engenders other changes bearing on individual status and economic growth. For example, when resorted to as a palliative for unemployment it tends either to burden still further the aged population with a more than proportionate share of social costs, as earlier retirement brings lower incomes, or to expand government spending and related transfer payments as the state restores actuarial income losses.

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[2] Lenore E. Epstein, "Money Income of Aged Persons, Mid-1960," *Social Security Bulletin,* 24 (1961), pp. 12–17.

[3] Flexible retirement may be defined more broadly than this to include also the privilege of deviating from the standard number of hours of work, or shifting to another, less demanding occupation. In this essay, except where noted specifically, the simpler definition applying only to varying the retirement age will be employed.

What actual evidence of flexible retirement can be placed against this economic rationale? How prevalent is it? What is the level of economic development of nations practicing it? What is the level of employment of nations making use of such provisions? These questions need answering. International statistics, however, although expanding rapidly in both quantity and quality, do not yet offer evidence sufficiently complete and pertinent to provide a basis for secure conclusions. This essay, then is an attempt to approximate preliminary answers suggesting, in part, new avenues for statistical development.

INCIDENCE OF FLEXIBLE RETIREMENT

Public pensions are part of the general social security programs. Included with them under this general category are survivors' benefits, sickness and maternity payments, workmen's compensation, unemployment insurance, and family allowances. Among the hundred-odd nations maintaining social insurance programs, considerable diversity of emphasis exists as to which coverages are deemed most worthy. Thus, family allowances, public health, and public assistance are emphasized more in most countries than social insurance schemes. Undeveloped countries in particular tend to give priority to sickness and maternity benefits and workmen's compensation laws over public pensions.[4] Thus there are some forty nations with social security programs, but without retirement benefits.

Among the sixty-odd nations mounting public pensions, about two-fifths have flexible retirement features. Usually these provisions allow increased payments if retirement is deferred and often allow smaller benefits if retirement is accelerated. In a few cases they also permit pensions to begin at younger ages if unemployment persists for a year or more.[5]

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[4] U. S. Department of Health, Education, and Welfare, *Social Security Programs throughout the World, 1961* (Washington, 1961).

Some clustering of countries with variable pensions is apparent in a geographic sense. Thus, among the states operating public pension programs, shown in Table 1, about one-half of those in America and Europe exhibit flexible retirement features, while only a few of those in Africa, Asia, and Oceania, have such provisions. This geographic arrangement suggests the existence of some relationship between the level of economic development and the status of social insurance.

Table 1. Public Pension Programs With and Without Flexible Retirement Features

	With flexible retirement		Without flexible retirement	
Africa	Israel		Congo	South Africa
	Upper Volta		Libya	United Arab Republic
			Morocco	
America	Argentina	Nicaragua	Bolivia	Dominican Republic
	Chile	Panama	Brazil	Ecuador
	Costa Rica	Paraguay	Canada	Peru
	Guinea	Uruguay	Cuba	
	Mexico	United States		
Asia			Ceylon	Iraq
	China		China	Japan
	(Nationalist)		(Communist)	Malaya
			India	Philippines
			Iran	
Europe	Austria	Greece	Albania	Norway
	Belgium	Iceland	Bulgaria	Poland
	Czechoslovakia	Italy	Cyprus	Portugal
	Denmark	Sweden	Germany (East)	Rumania
	Finland	Turkey	Hungary	Spain
	France	United Kingdom	Ireland	Switzerland
	Germany (West)	Yugoslavia	Luxembourg	U. S. S. R.
			Netherlands	
Oceania			Australia	
			New Zealand	

Source: Developed from U. S. Department of Health, Education and Welfare, *Social Security Programs Throughout the World, 1961* (Washington, 1961).

Within no single geographic area is a correlation between income and flexible retirement evident. If, for example, the nations of Europe are arrayed according to some measure of per capita income as in Table 2, no more of them above the median level are found to have variable retirement than those below. This lack of relation-

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[5] *Ibid.*, see p. 70 regarding West Germany, for example.

Table 2. Per Capita Net National Product of European States With and Without Flexible Retirement

Country	Net national product (1952–54)	Flexible retirement[a]
Switzerland	1010	–
Sweden	950	+
Luxembourg	890	–
Belgium	800	+
Iceland	780	+
United Kingdom	780	+
Denmark	750	+
France	740	+
Norway	740	–
Finland	670	+
Germany (West)	510	+
Netherlands	500	–
Ireland	410	–
Austria	370	+
Italy	310	+
Greece	220	+
Turkey	210	+
Portugal	200	–

Source: The United Nations, *Per Capita National Product of Fifty-Five Countries: 1952–1954* (New York, 1957), p. 7; and U. S. Department of Health, Education, and Welfare, *Social Security Programs Throughout the World, 1961* (Washington, 1961).

[a] Presence of flexible retirement program (+), absence (–).

ship is notable even more widely among the economically advanced nations of the world. Thus Australia, Canada, Luxembourg, the Netherlands, and Switzerland are in the "have not" column of Table 1. Although flexible retirement, then, is concentrated in Europe and America, in areas characterized by high levels of economic development, its incidence within these areas does not seem to be directly associated with income.

POPULATION GROWTH AND STRUCTURE

As might be anticipated, the existence of detailed demographic statistics and the presence of broad social security programs go hand in hand. For this reason, since usable reports for this purpose are submitted to world organizations only by the more highly developed nations, there is an inherent bias in any attempted correlation between population structure and the availability of old age pensions. Table 3 is a case in point. The nations represented here are

Table 3. Percentage of Total Population 65 Years of Age and Over and Presence or Absence of Public Pension Programs and Public Programs With Flexible Retirement Features for Selected Countries

Country	Percentage of population aged 65 and over	Pension program in existence*	Flexible retirement feature*
East Germany (including East Berlin)	13.61	+	–
Austria	11.72	+	+
Belgium	11.68	+	+
France	11.55	+	+
United Kingdom	11.54	+	+
Sweden	11.22	+	+
West Germany (including West Berlin)	10.44	+	+
Norway	10.42	+	–
Luxembourg	10.34	+	–
Denmark	10.10	+	+
Switzerland	10.01	+	–
Netherlands	8.72	+	–
Hungary	8.65	+	–
Australia	8.41	+	–
Greece	7.88	+	+
Iceland	7.72	+	+
Portugal	7.38	+	–
Spain	7.29	+	–
Bulgaria	7.24	+	–
Finland	7.05	+	+
Rumania	6.37	+	–
Yugoslavia	6.13	+	+
Albania	6.11	+	–
Poland	5.60	+	–
Nepal	4.98	–	–
Turkey	3.42	+	+
Philippines	2.79	+	–
Kuwait	2.39	–	–
Thailand	2.36	–	–

Source: United Nations, *Demographic Yearbook, 1959* (New York, 1959), pp. 158–164, and U. S. Department of Health, Education, and Welfare, *Social Security Programs Throughout the World, 1961* (Washington, 1961), pp. 1–203.

* Presence of pension program or flexible retirement provision (+), absence (–).

not only a workable number of states and a cross-section of population structures, but also all of the countries of Europe for which such demographic and social information are available plus a scattering of other nations from Asia and Oceania. The twenty-nine nations listed there represent little over one-quarter of those carrying on some type of social security activity, and about one-half of those providing old age pensions.

All but three of the countries in Table 3 provide old age pensions. It is notable that this absence of pensions occurs among nations with small percentages of their populations aged 65 and over. This would imply that if comparable population data were available from all nations in the underdeveloped group where lower percentages of older persons persist, many fewer old age plans would be found than among the more highly developed countries. Thus pension programs seem to be linked with populations showing a heavy concentration in the advanced age group. This is perhaps evidence of need giving voice to action. In the less highly developed nations, intense pressure for social expenditure to keep the population alive until old age is responded to first before demands are generated by a large segment of the people for old age pensions. Thailand, for example, with a population segment in the age sixty-five and over category about one-fifth that of the U. K., France, and Belgium, adopted in 1954 a social insurance act providing old age benefits. This law never came into force and was abrogated in 1958.[6]

This same reasoning may be refined regarding flexible retirement. Nations with a larger proportion of aged population and so a greater concern with the problem show the presence of flexible retirement provisions in their programs. Thus more of the nations in the upper half of Table 3 where the percentages of aged are higher have flexible retirement than those in the lower half where densities are lower. This finding may be combined with the earlier evidence regarding its geographic distribution to state: Flexible retirement tends to be found in Europe and America among the nations with large proportions of their populations aged 65 and over.

The concentration of older persons in the population does not seem to influence appreciably the proportion of the aged receiving pensions. As might be expected, in countries with larger numbers of older individuals, greater proportions of the populations receive pensions. But the percentage of older persons actually drawing pensions varies erratically among population structures showing high proportions of aged persons.

This inference is drawn from Table 4, where percentages are rounded severely from the original computations in keeping with the many variables influencing the data. Four characteristics of national environments loom behind the figures. (1) The numbers in both columns depend in part on the date the country's pension plan was adopted. Other things remaining constant, the earlier the plan

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[6] U. S. Department of Health, Education, and Welfare, *op. cit.*, p. 178.

Table 4. Percentage of Total Population and Population Aged 65 and Over Drawing Old Age Pensions in Selected Countries

Country	(1) Percentage of total population	(2) Percentage of population aged 65 and over
Austria	3	30
Belgium	3	20
France	4	40
United Kingdom	9	80
Sweden	8	70
West Germany (including West Berlin)	5	40
Norway	6	60
Denmark	6	60
Switzerland	10	100
Netherlands	7	80
Hungary	4	50
Australia	5	60
Greece	■	10
Iceland	4	60
Portugal	*	*
Spain	3	40
Bulgaria	1	20
Finland	7	100
Yugoslavia	1	10
Poland	1	20
Turkey	■	*
Philippines	*	■

Source: United Nations, *Demographic Yearbook, 1959* (New York, 1959), 158–164; and International Labor Office, *Year Book of Labour Statistics, 1961* (Geneva, 1961), pp. 483–488.
* Less than 0.5 per cent.

was put into operation, the larger the percentage of older persons fully qualified to participate in the benefits. On this reasoning, Germany with the earliest plan (inaugurated in 1889) should show the largest percentages.[7] The relevance of this point is especially noteworthy in light of the number of new programs put into effect only recently.[8] (2) Coupled with this fact was the decision to use the year of the most recent census as the basis for selecting both population and beneficiary figures. If this had not been done, a growing and maturing population might have modified the percentages appreciably. On the other hand, major alterations in programs frequently lead to sharp changes in the number of beneficiaries. Where this influence seemed to dominate the recent trend, later beneficiary

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7. Wilbur J. Cohen and Carl H. Farman, "Social Security Programs throughout the World, January 1955," *Bulletin of the International Social Security Association,* 8 (1955), p. 324.

8. Compare two recent summaries: U. S. Department of Health, Education, and Welfare, *op. cit.* with its *Social Security Programs throughout the World, 1958* (Washington, 1958).

figures were employed.[9] In general, since pension programs have been growing both as a result of changes in the laws and expansion in the number of older persons, the more recent the year for which data were available, the larger the percentage in both columns of Table 4. (3) Comprehensiveness of the plan itself had a strong bearing on these percentages, especially those in the second column. Finland and Switzerland with universal coverage show 100 per cent in contrast with other nations with less inclusive programs where smaller numbers qualify for pensions. (4) The age structure of the population is relevant also. This is the reason countries are listed in order according to the proportion of older persons in the populations. Reference to the data used to create Table 3 shows that even if the Philippines, for example, provided pensions to all persons aged sixty-five and over, this would amount to only 690,000 individuals, or less than 3 per cent of the total population. In addition, seven of the countries shown in Table 3, East Germany, Luxembourg, Rumania, Albania, Nepal, Kuwait, and Thailand, do not appear in the later table since either no public pension is offered or insufficient information concerning beneficiaries is available.

But for most pension programs the present structure of the population is of transient moment. This is especially true for newer plans adopted in countries where a rapid increase in the number and proportion of older persons may take place in the future. Some idea of the probable magnitude of the problem may be gained from studying the current life expectancies of the nationals of countries examined previously. Shown in Table 5, they are again arranged in descending order according to the percentage of the total population aged 65 and over. The values in column (1) give average life expectancies for males at birth. The range is large, from less than 50 years to more than 70. As would be anticipated, there is a definite positive rank correlation between this series and the proportion of the population aged 65 and over.[10] This emphasizes the greater life expectancy of more highly developed nations where health and economic standards are generally higher than they are in the less developed countries.

Relating the life expectancy of males at age 65 to the proportion of the total population aged 65 and over is another matter. As is evident in Table 5, a comparison of the rankings of the expectancies in column (2) with the order of nations in the table shows little relationship. Responsible for this lack are such forces as the inherent differences in ethnic stocks, the selective process of less advanced economies, and, even, the sometimes deleterious results of high cultural development. In terms of pension programs this means that although the proportion of the population of underdeveloped countries reaching 65 will probably increase with economic advance, the life expectancy of those reaching 65 may remain relatively unchanged. This suggests that in underdeveloped nations in spite of the possible absence of any substantial increase in the duration of pensions, there will probably be an increase in both the actual and relative numbers of pensioners. In this situation what changes in costs may be anticipated with the introduction of flexible retirement?

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[9] See comments concerning the difficulties of obtaining meaningful information in this field, International Labour Organization, "Old-Age Protection Under Social Security Schemes," *International Labour Review,* 82 (1960), pp. 542–571.

[10] A Spearman's coefficient of +0.933 is registered.

Table 5. Life Expectancies of Males at Birth and at 65 in Selected Countries

Country	(1) Life expectancy at birth	(2) Life expectancy at age sixty-five
East Germany (excluding East Berlin)	66.3	12.9
Austria	61.9	12.0
Belgium	62.0	12.3
France	65.0	12.1
United Kingdom (England and Wales, only)	68.0	11.9
Sweden	70.5	13.8
West Germany (excluding West Berlin)	64.6	12.8
Norway	71.1	14.9
Luxembourg	61.7	11.9
Denmark	69.9	13.9
Switzerland	66.4	12.4
Netherlands	71.0	14.1
Hungary	65.0	12.6
Australia	67.1	12.3
Greece	49.1	13.1
Iceland	66.1	14.7
Portugal	59.8	12.1
Spain	58.8	12.0
Bulgaria	45.9	13.5
Finland	63.4	11.2
Yugoslavia	56.9	11.9
Poland	61.6	12.2
Philippines	48.8	14.7
Thailand	48.7	9.6

Source: United Nations, *Demographic Yearbook, 1959* (New York, 1959), pp. 638–644.

BENEFITS AND COSTS OF FLEXIBLE RETIREMENT

Both advantages and disadvantages are involved in a flexible retirement program. Overlooking those to the individual such as the added satisfaction of more leisure or the loss of income at early retirement, gains and loses to the national economy may be viewed both in terms of their immediate impact and as related to their more remote prospects. Thus each advance in the average retirement age results in an increase in the labor force, and so, *ceteris paribus,* an expansion in the potential national product, while every decrease produces a reduction in one and a probable decline in the other.

Ideally, it would be possible to relate changes in the retirement age produced by flexible retirement with shifts in the aggregate demand for non-durable goods in comparison with durable, changes in the rate of interest, modifications in the tax rate, and alterations in the price of stock. Practically, only indirect indications of its impact are readily available from international statistical evidence. One detailed source is a study by the International Labour Office which reveals that for almost all of the thirty countries reporting usable data, social security income has exceeded expenditures in almost every year.[11] This source discloses further that by several measures expenditures increased both actually and relatively. Almost all of these nations showed a substantial growth in the percentage of national income (at factor cost) devoted to social security items. In fact, only four nations (New Zealand, Turkey, the United Kingdom, and Yugoslavia) showed declining percentages.[12] Almost this same situation prevails when the trend of benefit expenditures as a percentage of total consumption expenditures is reviewed. In this situation, in which benefits customarily have increased and pension funds usually have operated with a surplus, it is of interest to inquire: Who bears the costs of pensions?

Social security costs in general are borne one-half by employers, one-third by participants, and one-sixth by the state and others. Based on data from thirty-one countries summarized in Table 6, they show the average payments from the four classes of contributors weighted according to the population of each state. Based largely on payroll taxes from employees and employers, they include also the state share comprising other special social security taxes, contributions from the general budget, and the participation of other public authorities. In addition, income is netted from investments, transfers from other insurance schemes, and finally, from certain miscellaneous sources. These averages conceal the range within each category. Thus Poland and Yugoslavia exact no contribution from participants while Israel and the Netherlands assess almost 50 per cent of total expenses on them. In the employer category it ranges from less than 5 per cent in Denmark and New Zealand to almost 100 per cent in Poland and Yugoslavia. The importance of the state's role also varies widely from no contribution at all in several countries, such as Ceylon, Malaya, and Turkey, to about three-fourths in Australia, the Union of South Africa, and Ireland.

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[11] International Labour Office, *The Cost of Social Security, 1949–1957* (Geneva, 1961), pp. 199–204.

[12] *Ibid.,* pp. 205–211.

Table 6. Average Proportion of Social Security Payments Received from the Insured, the Employers, the State, and Others Weighted According to Population in Countries With and Without Flexible Retirement Programs

Percentage contributed by	In all nations for which data is available	In nations with flexible retirement programs	In nations without flexible retirement programs
Participants	34	28	38
Employers	49	55	45
The State	11	10	12
Others	6	7	5
Total	100	100	100

Source: International Labour Office, *The Cost of Social Security, 1949–1957* (Geneva, 1961), pp. 233–238, and United Nations, *Demographic Yearbook, 1959* (New York, 1959), pp. 150–170. Roundings adadjusted to maintain internal consistency.

The relevance of this distribution of costs as well as related benefits to the present inquiry lies in the leverage exerted by them as transfer payments. Clearly the greatest bulk of the assessment falls on employers, where it competes with investments for available funds. Next in size are the contributions of participants, mainly payroll deductions. If incomes are maintained close to preretirement levels in retirement, little leverage will result from this source since pension receivers and wage earners at each income level differ only moderately in their expenditure patterns. If pension incomes are not maintained at previous wage levels, then income declines among the aged may shift expenditures toward the soft goods and services sectors.[13] As a result of the state's contribution, taxes in general will be higher; and since the propensity to consume of the low income pensioner may be quite close to unity, goods and services expenditures will be increased.[14]

Among the number of nations in Table 6 having flexible retirement features in their programs and the nations without such features there is an almost equal division, sixteen to fifteen respectively. Because in arriving at an over-all summary figure the averages for each country were weighted by their populations, two populous nations in the "without" group, India and Japan, dominate the summary figures. Although the range of variation is just as broad in one category as it is in the other, participants tend to be heavier contributors in the "without" group while employers tend to be in countries with flexible retirement. This is the situation as it stood recently, but what is the direction of change?

No clear pattern of change over the recent past emerges from these data. Reviewing the rate of contribution of participants in the twenty-seven of these same countries for which data are available for a number of years since World War II, about the same number of countries show increases as register declines. In spite of the fact that substantial individual increases and decreases did occur, a tally of these balances one against the other.[15] The pattern of contributions seems clearly defined. Apart from some special situations where one class of contributor or another is uniquely dominant, the ranking in declining order of employers, participants, and the state is well established.

FLEXIBLE RETIREMENT AND THE SIZE OF THE LABOR FORCE

Flexible retirement is sometimes advanced as a device for coping with unemployment.[16] By moving older workers out of the labor force, the theory runs, it serves to reduce the number of unemployed, especially at advanced age levels where re-employment is difficult to achieve. A number of nations not only provide for earlier retirement if the employee elects to do so, but also grant a pension if an unemployed worker has reached a minimum age and has been out of work for a stipulated period. Austria and West Germany, for example, tie earlier than normal retirement to unemployment,[17] and the United States listed as one of the reasons for adopting flexible retirement the amount of unemployment among older workers.[18]

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[13] Sidney Goldstein, *Consumption Patterns of the Aged* (Philadelphia, 1960), p. 282.

[14] Richard A. Musgrave, *The Theory of Public Finance* (New York, 1959), p. 244.

[15] International Labour Office, *op. cit.*, pp. 233–238.

[16] Daniel S. Gerig, "Pensionable Age under Old-Age Pension Schemes," *International Labour Review*, 72 (1955), pp. 281–282.

In other nations the possibility of encouraging the deferment of the retirement age appears to be a major *raison d'être* of flexible retirement. Presumably countries with very low levels of unemployment should be interested in expanding the labor factor of production by encouraging older workers to continue in the labor force beyond the normal retirement age. The United Kingdom, Yugoslavia, and Italy are cases in point.

If flexible retirement were enacted principally on the basis of employment conditions, countries with large amounts of unemployment would provide for the election of earlier retirement to reduce unemployment while nations with very high levels of employment would provide for the election of later retirement to expand the labor force. A limited test of this hypothesis is feasible. To remove to some extent the possible influence of location, a single geographic area was selected. Adequate statistics to compute the percentage of unemployment are available from twelve European countries. They are ranked in Table 7 according to their median percentage of unemployment from 1951 to 1957 inclusive. Shown in the adjacent column is the presence or absence of flexible retirement.

It is clear that three geographically dispersed countries in Europe with extremely low levels of unemployment do not have flexible retirement provisions, while all but one of the nations with higher levels of unemployment have flexible retirement. Further, Italy with a high level of unemployment provides flexibility only for later rather than earlier retirement. Thus flexible retirement does not seem to be adopted primarily to help remove the friction of a fixed retirement age so that the market mechanism can function more adequately in adjusting the size of the labor force to the needs of the economy.

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[17] U. S. Department of Health, Education, and Welfare, *Social Security Programs . . . 1961*, *op. cit.*, pp. 8 and 70, and Gerig, *op. cit.*, p. 281.

[18] House Ways and Means Committee, *Social Security Amendments of 1961*, March, 1961, p. 12.

Table 7. Relationship Between the Amount of Unemployment and the Availability of Variable Retirement in Certain European Countries

Country	Median percentage of unemployment (1951–57)	Availability of variable retirement [a]
Switzerland	0.8	–
Norway	1.3	–
United Kingdom [b]	1.5	+
Netherlands	1.9	–
Sweden [b]	2.3	+
Yugoslavia [b]	3.9	+
Austria	5.7	+
Germany (West)	7.0	+
Ireland	8.1	–
Denmark	9.7	+
Italy [b]	9.8	+
Belgium	9.8	+

Source: Statistical Office of the United Nations, *Statistical Yearbook 1958* (New York, 1958), pp. 52–53.

[a] Presence of flexible retirement program (+), absence (–).

[b] Presence of flexible retirement at a later age than normal.

INFERENCES

Because of the difficulties related to any international comparison and the inadequacies of presently available evidence, no definite conclusions are possible at this point. It is reasonable only to review the inferences encountered thus far.

1. Flexible retirement, as a rather sophisticated expression of social security programs, tends to appear in highly developed nations.

2. Population structures, although apparently influencing the adoption of complete pension programs, do not seem to influence the introduction of flexible retirement.

3. Costs of social security are borne in major part by employers. Thus, any increase in costs, such as those associated with advancing the retirement age under flexible retirement, may produce a leverage effect on the economy involving a shift toward the consumption of soft goods and services and away from capital goods and long-term investments.

4. Although a flexible retirement program might rationally be instituted to help adjust employment to economic needs, in general

the actual adoption of flexible retirement may not have taken place with this aim in view.

In sum these inferences spell a social refinement sometimes arbitrarily applied. To the extent that these findings are valid they suggest the adoption of social legislation without sufficient adaptation to the local scene. Because of this the introduction of flexible retirement in some states tends to work toward a poorer instead of a better adjustment of the nation's labor force to its economic requirements. Furthermore, the additional cost of programs designed to lower unemployment by providing earlier retirement alone, may find reduced economic growth because of higher transfer payments and interest rates to be a high price to pay for an immediate and perhaps transient palliative for unemployment. Although flexible retirement in this vein may be a poor foil for reducing the size of the labor force, it may still act to reduce the friction of a fixed retirement age. Permitting *both* earlier and later retirement may enable the market mechanism to adjust the size of the labor force more accurately to the needs of the economy.

Two observations are in order. First, statistical reports not only in this field but also in others as well require major expansion if international comparisons are to be used effectively in generalizing from past experience. Second, perhaps it is not only the lack of statistical evidence but also the very nature of the problem that evokes an absence of correlation. Conceivably flexible retirement and other sophisticated social insurance provisions are adopted at times not because of any sufficient economic motive but rather as a symbol of a maturing program of social legislation.

John O. Blackburn

V. PENSIONS, THE NATIONAL INCOME, AND THE NATIONAL WEALTH

1. INTRODUCTION

This study has as its purpose an examination of the impact of pension funds on such economic quantities as national income, consumption, saving, interest rates, and national wealth, all within the context of various models of the economy. After some general statements concerning recent developments in pension funds, the analysis begins with the simplest possible static model. It then examines, in turn, the effects of changes in certain variables associated with pension funds upon the economic quantities mentioned above. Next, it considers certain dynamic situations and, finally, the study attempts to draw some conclusions valid for our present-day economy.

2. PENSION FUNDS IN THE AMERICAN ECONOMY

Accumulations in pension funds represent saving, both from the standpoint of the individual and of the nation, in that currently earned income is not used for consumption spending.[1] From the standpoint of the individual participant in a pension plan, this saving is represented by an asset, namely, the present value of future benefits which he will receive. The asset is likely to be highly illiquid; indeed, it may be eventually collectible only under certain conditions of service and age. Vesting provisions, which vary considerably from one plan to another, may render the asset somewhat more liquid, but it remains, in most cases, the least liquid of all individual assets.[2] Nonetheless, additions to pension funds do represent savings, a fact which has important implications for the entire economy.

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[1] This statement assumes, of course, that employee and employer contributions to pension funds may be imputed to employees as additional earnings. This is the treatment adopted in the U. S. national income and product accounts with respect to private pension plans but not, curiously enough, with respect to plans for federal civil service employees, state and local government employees, and railroad workers covered by the federally-managed funds.

By the end of 1960 all public and private pension funds held assets in the amount of $105.9 billion.[3] If the funds maintained under the old age, survivors, and disability insurance programs are omitted (since these funds are virtually on a pay-as-you-go basis), the total of private and public funds operated more or less on an actuarial basis and at least partially funded still amounted to $83.3 billion.[4] Of more significance, perhaps, than the absolute size of the funds is the very rapid rate of growth which has been typical of recent years. Pension funds as defined above held assets of $23.8 billion in 1950; thus during the decade of the 1950's their assets increased by 250 per cent, giving an annually compounded growth rate of approximately 13 per cent.

The largest component of these pension funds is corporate non-insured funds, holding assets of $28.7 billion (book value) at the end of 1960. The bulk of the remainder is accounted for by state and local funds ($19.1 billion), reserves of insurance companies held against insured plans ($19.0 billion), and the federal civil service funds ($10.5 billion). The most rapidly growing component is the corporate non-insured segment, which grew from $5.5 billion to $28.7 billion in the 1950–60 decade.[5]

In 1960 alone, pension funds grew by $8.1 billion, a figure which represents 31 per cent of all personal saving.[6] A comparison with roughly estimated national wealth may aid in evaluating these figures; pension funds in 1960 represented an amount equal to over 4 per cent of the national wealth.[7] The funds hold, naturally, a much larger share of certain types of assets since not all forms of wealth are suitable investment outlets. For a more extended discussion of fund holdings, and their social and legal implications, particularly with respect to common stocks, the reader is referred to Harbrecht's *Pension Funds and Economic Power*.[8]

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[2] For this reason, among others, saving through equities in pension funds may be of limited substitutability for other forms of saving. The highly important consequence is that pension fund saving may well increase the total volume of national saving from any given level of national income over what it would be in the absence of pension plans. Thus it augments, rather than merely substitutes for, other forms of savings. The impact of pension plans on aggregate saving has been under study by the National Bureau of Economic Research as a segment of a research project in the economics of pensions. None of the results have yet been published, but preliminary reports indicate agreement with the above conclusion. See National Bureau of Economic Research, *Forty-Second Annual Report* (New York, 1962) p. 63.

[3] Securities and Exchange Commission, *Corporate Pension Funds, 1960,* Statistical Series, Release No. 1750 (Washington, D. C., 1961).

[4] *Ibid.*

[5] *Ibid.*

3. A SIMPLE MODEL FOR PENSION FUND ANALYSIS

As a means of bringing into focus the role of pension saving in an economy, let us consider the first of a number of simplified models, a highly idealized, hypothetical economy with the following characteristics:

1. The population is fixed at 75,000,000 people, one million in each age bracket, 0–74. Each January 1 there are simultaneously one million births and one million deaths, all of the latter with respect to those just reaching age 75.

2. Every individual enters the labor force at age 21 and leaves, via retirement, at age 65. The labor force is thus constant at 44 million.

3. The economy is in a situation of long-run static equilibrium. The national income is entirely consumed, with the pattern of consumption unchanged from year to year. Quantities and prices of consumer goods, then, do not change. There is no net national saving, although working individuals save and retired individuals dissave in exactly offsetting amounts. A given, unchanged state of technology in production is likewise assumed.

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[6] Saving as reported in the national income accounts is adjusted to include additions to state and local, federal civil service, and railroad retirement funds. The author sees no particular reason for treating these funds any differently from private funds. Treatment of the OASDI funds is another matter; while there seems to be some room for argument, these funds have been omitted throughout the discussion. This treatment of government funds is consistent with that of the Flow of Funds section, Board of Governors of the Federal Reserve System.

[7] As estimated by Raymond Goldsmith for 1958 and extrapolated two years, using recent growth rates. *Statistical Abstract of the United States* (Washington, D. C., 1960), p. 326.

[8] Paul P. Harbrecht, S.J., *Pension Funds and Economic Power* (New York: The Twentieth Century Fund, 1959).

4. Each worker earns $5,000 per year, so that the wage component of the national income is $220 billion. Further, each worker belongs to a pension plan which pays a ten-year retirement pension of $2,500 annually, half his working income.

5. No saving is done outside the pension plans, nor has any ever been done in the economy. The pension funds, then, own all of the economy's real capital, either directly or through holdings of securities. Natural resources and their ownership are ignored in the model in order to focus attention more clearly on matters relating to capital and interest. As a corollary, all property income is received directly by the pension funds, although it is implicitly received by individuals through additions to their pension equities. The latter are household assets, and pension fund liabilities.

6. It is assumed that capital throughout the economy yields 3 per cent under the given conditions of static equilibrium. That is, the marginal product of capital is equalized in all employments such that the ratio of capital return to capital itself is 3 per cent. In the absence of uncertainty, there is but one rate of return on all property, whether described as dividends, interest, rent, or profit.

7. Government is assumed away, again in order to focus attention only upon the variables under consideration.

The study, it should be noted, is not yet concerned with the time-path taken by the economy in reaching this position of static equilibrium. Indeed, we are not yet considering the dynamic question of whether such an equilibrium is attainable. So far our only concern is with the characteristics of the static equilibrium itself.

With the aid of an annuity table, it may be seen that each worker in the economy would make an annual contribution to his pension fund of $246.67. This annual payment, accumulated for 44 years at 3 per cent, would yield the required 10 payments of $2,500 during the retirement period. Further calculations show that the pension funds would total $471.56 billion, the summation of accumulated contributions for the workers and retirees in each age bracket. The fund balance is stable, since the annual contributions, $10.85 billion, plus interest at 3 per cent on the fund balance, or $14.15 billion, exactly equal the $25 billion paid to retirees.

National income, which is identical to the net national product in the assumed absence of indirect business taxes, is equal to aggregate wages of $220 billion plus property income of $14.15 billion, or $234.15 billion. Gross national product is larger by the amount of capital consumption, which exactly offsets production of new capital goods. Net investment is thus zero, and consumption equals net national product (national income). The ratio between the stock of capital and the national income, both measured in current (and stable) prices, would be 2.01. This ratio will be referred to below as the (aggregate) capital-output ratio even though, strictly speaking, the term should be used to relate the stock of capital to gross national product.[9] Finally, the division of the national product between retired persons and the rest of the community is $25 billion (10.7 per cent) and $209.15 billion (89.3 per cent), respectively, the latter figure being the remainder of wage payments in the economy after pension fund contributions.[10]

Suppose now that the model economy described above had attained a position of long-run equilibrium, not at an interest rate of 3 per cent, but at 6 per cent, 5 per cent, or any other rate, positive or zero. For each interest rate there would be a new equilibrium national income, stock of capital, and set of prices and quantities of both capital goods and consumer goods. It is not possible, with the information given, to determine the resulting changes in real income, because these changes would depend on the economy's real, aggregate "production function." However, as long as there is an equilibrium set of prices and incomes, a new capital-output ratio may be computed, without regard to changes in "real" output or "real" capital. The ratios resulting from computations similar to that above, but assuming various equilibrium interest rates appear in Table 1.

It should be noted that the data in Table 1 constitute a supply curve of capital, at least in the restricted sense of a stock rather than flow quantity. The table indicates the quantity of capital (measured at equilibrium prices and stated as a ratio with respect to equilibrium national income) which is consistent with each equilibrium interest rate. Were the demand for capital (marginal productivity) stated in

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[9] Gross national product remains unspecified in this model, but there is no loss of precision thereby. Given the mean useful life of capital goods and an assumed depreciation pattern, capital consumption could easily be computed and added to net national product.

[10] At this point one must reckon with the vast literature in economics relating to the stationary state and the rate of interest, and the related controversy as to the possibility of a non-zero interest rate in the absence of growth. The position taken by the author is that the nature of a model depends on the assumptions made in constructing it. That is, if one assumes that saving will cease at some rate of interest above zero, there is nothing at all wrong with a model economy in static equilibrium with a positive rate of interest. Assertions to the contrary are assuming, explicitly or implicitly, that the supply curve of new saving as a function of the interest rate passes through the origin. Here, as elsewhere in economics, one should not be surprised when assumptions emerge as conclusions in slightly altered form.

Table 1. Capital-Output Ratios at Various Interest Rates

Interest rate	Capital-output ratio
0%	2.95
1	2.58
2	2.28
3	2.01
4	1.79
5	1.60
6	1.43

the same terms (interest rate and capital-output ratio), the equilibrium level of the two variables would be determinate. The results of shifts in the variables defining the supply function, discussed at length below, could be measured. It should be further noted that the equilibrium capital-output ratio is inversely related to the interest rate, a result hardly surprising given the assumed purpose of all national saving.

It is possible to change other variables in the simple model in the same way, noting the effects on the capital-output ratio. Suppose, for example, that there were an increase in the life span from 75 to 85 years, with the 44-year working life unchanged. One would surmise that a larger fund would be required for each worker, other things equal, in order to support the payment of pensions for 20 years rather than 10. Such is indeed the case; Table 2 shows the various quantities of capital (measured in terms of the equilibrium capital-output ratio) associated with various possible life spans, with working life unchanged at 44 years and interest at 3 per cent. Also shown is the significant shift in the share of national income going to the retired segment of the population.

Table 2. Capital-Output Ratios and Shares of National Product at Various Life Spans

Life span	Capital-output ratio	Share of national product to retired persons (percent)
75	2.01	10.7
77	2.43	12.6
79	2.86	14.5
81	3.28	16.4
83	3.70	18.2
85	4.12	19.9

Another possible change is in the age of retirement. Suppose that longevity remains at the original 75 years, but that the age of retirement is lowered from 65 to 60 or 55. Again, one would expect the required fund per person to rise, since the retirement period over which benefits are paid is longer. Moreover, annual contributions would rise since there would be a shorter period over which each individual would build up the required fund. The effects of changing the retirement age, with the life span at 75 and interest still at 3 per cent, appear in Table 3.

Table 3. Capital-Output Ratios and Shares of National Product at Various Retirement Ages

Retirement age	Capital-output ratio	Share of national product to retired persons (percent)
65	2.01	10.7
63	2.48	13.2
62	2.72	14.6
60	3.23	17.4
58	3.76	20.4
55	4.63	25.3

Suppose, to consider an extreme example, that the life span rose to 85 while the retirement age fell to 55. Further, let us recognize that successive increases in the quantity of capital would result in a lower marginal productivity of capital, and hence, in a lower interest rate. This fundamental physical relationship, which has been suppressed in the *ceteris paribus* cases above, now needs explicit recognition. In this situation, assuming only a modest decline to 2 per cent in the interest rate, the equilibrium position of the economy would indicate a capital-output ratio of 8.45 with 36.7 per cent of the national product going to retired individuals. Though one would not ordinarily draw any conclusions about our own economy from such a simple model, it is apparent that there must be some limitations on possible trends toward earlier retirement, given an ever-lengthening life span.

4. A CONTINUOUS MODEL IN PENSION FUND ANALYSIS

The simple model just presented suggests some of the ways in which pension fund variables—such as length of working life, length of retirement, and interest rates—affect the working of the economy. There are, of course, a great many more variables than these. To incorporate some of these into our model analysis is the next task to which this paper is addressed. To render the mathematics more tractable, most of the analysis which follows assumes that fund receipts and disbursements are made continuously rather than in annual installments as used above.

The fund required to support at retirement a given worker at a given level of benefits may be stated as follows:

$$f = \frac{a}{r}(1 - e^{-rv}), \tag{1}$$

where

f = the required fund,
a = the desired benefit, at an annual rate,
r = the assumed interest rate, and
v = the number of years of retired life.

The above formula is, of course, merely the present value of a stream of income, in the amount a per year, for v years in the future, discounted continuously under the assumption that a and r do not vary.

If we assume that the fund accumulates and is compounded continuously over the working life of an individual, the required contribution at an annual rate is

$$c = \frac{rf}{e^{rw} - 1}, \tag{2}$$

where

c = the annual contribution, and
w = length of working life.

Substituting from (1) into (2), we obtain

$$c = \frac{a(1 - e^{-rv})}{e^{rw} - 1}. \tag{3}$$

In order to determine the fund accumulated to a man's credit at any time during his working life, we may simply accumulate c for the appropriate number of years. Denoting the fund accumulated over b years by f_b, we have

$$f_b = \frac{c}{r}(e^{rb} - 1). \tag{4}$$

Substituting (3) in (4), we have

$$f_b = \frac{a(1 - e^{-rv})(e^{rb} - 1)}{r(e^{rw} - 1)}. \tag{5}$$

Removing brackets, (5) becomes

$$f_b = \frac{a}{r(e^{rw} - 1)}[e^{rb} + e^{-rv} - e^{r(b-v)} - 1]. \tag{6}$$

In order to find the accumulated fund for the entire working population, it is first necessary to introduce a function defining the working population. To this end, assume that $f(b)$ is a function defining the number of individuals in any age bracket where b refers to age such that

$$\int_p^q f(b)db$$

gives the number of working individuals between ages p and q. If we continue the simplifying assumption that everyone enters the labor force at some arbitrary age, say 21, and retires at another arbitrary age, say 65, then the variable b can be restated so as to refer to years in the labor force: $b + 21 = \text{age}$, or b is the number of years worked to date. The size of the labor force is then given by

$$n = \int_0^{44} f(b)db, \tag{7}$$

or more generally by

$$n = \int_0^{w} f(b)db,$$

where w, as before, is the number of years each individual is active in the labor force.

The accumulated pension fund for the entire labor force may then be written as

$$\frac{a}{r(e^{rw} - 1)} \int_0^{w} [e^{rb} + e^{-rv} - e^{r(b-v)} - 1]f(b)db, \tag{8}$$

it being understood that the assumptions concerning uniform ages of entry, retirement, and death, constant interest rate, uniform benefits and equal annual contributions are retained.

In a similar manner, the fund for workers retired under pension coverage is found to be

$$\frac{a}{r}\int_0^v (1 - e^{-r(v-s)})\, g(s)ds, \tag{9}$$

where

$g(s)$ = the population function for the retired covered population,
s = years retired, and
v = number of years from retirement to death.

Again, we retain the assumptions concerning a constant interest rate r, a uniform annual benefit a, and a uniform age of death which occurs v years after retirement.

As an exercise, the assumptions given above in the first simple model may be reworked in terms of equations (8) and (9). The population functions are of the form $f(b) = 1{,}000{,}000$ and $g(s) = 1{,}000{,}000$, while $w = 44$, $v = 10$, $r = .03$, and $a = \$2{,}500$. First substituting $f(b)$ and $g(s)$, the fund formula becomes

$$\begin{aligned} F = {} & \frac{1{,}000{,}000a}{r(e^{rw} - 1)}\int_0^w (e^{rb} + e^{-rv} - e^{r(b-v)} - 1)db \\ & + \frac{1{,}000{,}000a}{r}\int_0^v (1 - e^{-r(v-s)})ds, \end{aligned} \tag{10}$$

where

F = the total fund.

Integrating and simplifying, (10) becomes

$$F = \frac{1{,}000{,}000a}{r}\left[\frac{w(e^{-rv} - 1)}{e^{rw} - 1} + v\right]. \tag{11}$$

Substituting values for r, w, and v, the fund is found to be \$486.72 billion. Annual contributions, stated at continuous rates, equal \$10.4 billion, and interest on the fund at 3 per cent is \$14.6 billion, yielding the required annual pension disbursements of \$25 billion. The fund thus computed is somewhat larger than that computed above where contributions, payments, and interest accruals were made once annually, since annual contributions are smaller, given continuous compounding.

5. A MODEL WITH CONSTANT GROWTH

We next consider one of the simplest possible forms of dynamic equilibrium, one in which population, output, and the stock of capital are all growing at the constant rate m per year. It is further assumed that the pattern of consumption remains unchanged, i.e., the output of each consumer good increases at 100 m per cent per year, and per capita consumption of each good does not change. Population grows in such a way that the number of individuals of each age is *100* $(e^m - 1)$ per cent larger than the number one year older. If the assumption of uniform mortality at some arbitrary age is continued, then the population will always be $(e^m - 1)$ times as large as it was one year before, the number in each age bracket having increased by that factor.

The required pension fund likewise grows at 100 m per cent per year, which implies that the stock of capital does also. Inasmuch as the labor-capital ratio does not change, the rate of interest will not vary, if one assumes that the aggregate production function is homogeneous of the first degree (continuing the earlier assumption that land and other natural resources are ignored).

Since the pattern of output does not change, the stock of *each kind* of capital good grows also by 100 m per cent per year, as does the labor force and stock of capital in the capital goods industries. Equilibrium prices exist for all capital goods, so that one may properly continue to measure the stock of capital in monetary units. It may further be shown that capital goods production is equal to depreciation of the existing stock, plus the required annual increment, both defined in continuous terms.

Under these assumptions, the number of people in the work force who have worked precisely b years is

$$f(b) = he^{m(w-b)}\,, \tag{12}$$

where

h = the number of persons in the one year age bracket just reaching retirement.

The size of the labor force is thus given by

$$n = \frac{h}{m}\,(e^{mw} - 1)\,. \tag{13}$$

The required pension fund with respect to the individuals working is then

$$\frac{ah}{r(e^{rw} - 1)} \int_0^w (e^{rb} + e^{-rv} - e^{r(b-v)} - 1)\, e^{m(w-b)}\, db\,. \tag{14}$$

Similarly, the fund with respect to those individuals already retired may be stated as

$$\frac{ah}{r}\int_0^v [1 - e^{-r(v-g)}]e^{-gm}dg, \tag{15}$$

where g is the number of years the persons in each age bracket have been retired to date.

Integrating (14 and 15), adding, and simplifying, the total required pension fund F is

$$F = \frac{ha}{m(r-m)(e^{rw}-1)}\left[(e^{-rv}-1)(e^{mw}-1) - (e^{-vm}-1)(e^{rw}-1)\right], \tag{16}$$

an expression which is valid for all positive values of the parameters except when $m = r$.[11]

It is possible at this point to consider in more detail the question of growth rates of pension funds as illustrated in the present simplified model, mostly as an introduction to some more complex cases treated later on in the paper.

Taking the logarithmic derivative of (16) with respect to t, we obtain

$$\frac{1}{F}\frac{dF}{dt} = \frac{1}{h}\frac{dh}{dt} + \frac{1}{a}\frac{da}{dt} - \frac{1}{m}\frac{dm}{dt} - \frac{1}{r-m}\frac{d(r-m)}{dt} - \frac{1}{e^{rw}-1}\frac{d(e^{rw}-1)}{dt} + \frac{1}{Z}\frac{dZ}{dt} \tag{17}$$

where Z is the expression in brackets in (16). This equation is, of course, the rate of growth of F. If a, m, r, w, and v are taken as fixed, all terms except the first are zero. The expression $\frac{1}{h}\frac{dh}{dt}$ is by definition equal to m, so that the growth rate of the fund is itself m, a conclusion which is certainly to be expected in the system under analysis. Should a be changing as well, all other variables except h held constant, the growth rate of the fund would be the sum of m and the growth rate of a.

Before proceeding to the next formulation, which drops some of the limiting assumptions at the cost of still greater complexity, it would seem appropriate to consider the continued assumption concerning a uniform age of death, one which is in strong contrast to the actual pattern of life expectancy as given by mortality tables. Actuaries of individual pension funds do, of course, base their computations on expected mortality, adjusted, perhaps, for guaranteed payments of five or ten years. A great deal of simplicity is gained in the present macroeconomic models by assuming a uniform life expectancy for all persons reaching retirement age.

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[11] There are, to be sure, some models in the literature for which $m = r$. These however, represent special cases, and stem, as always, from the assumptions made. If it is assumed, for example, that all property income but no labor income is saved, and that the capital output ratio is constant, then it follows that $m = r$. Let $Y =$ output, $K =$ the stock of capital and $r =$ rate of return on capital. Then Investment = Saving = rK; the growth rate of capital is $\frac{rK}{K} = r$; then if m is the growth rate in output $m = r$ since output and the stock of capital grow at the same rate.

The distribution of deaths per 100,000 individuals reaching age 65 in the U. S. is such that the required pension fund is very closely approximated by assuming uniform mortality at the median (not mean) life expectancy; calculating interest at 3 per cent, the error in the pension fund so computed is only about 2 per cent.[12]

It may further be observed that the difference between the aggregate pension fund requirements calculated on the basis of uniform mortality and the required funds based on actual mortality is a function of the interest rate and the parameters of the mortality function [13] for the over-65 population groups. It is, therefore, possible to compute a correction factor stated as a function of the interest rate, given a set of parameters for the retired population. Accordingly, the simplifying assumption of uniform mortality will be retained throughout the study, with little loss of precision.

6. A MODEL FOR THE UNITED STATES

It is now possible, by introducing still more variables, to specify a model which, though still simpler than necessary for the present-day U. S. economy, approaches the required degree of completeness. The formula for aggregate pension funds is developed in two parts; one with respect to presently employed individuals, and one with respect to those already retired. For the present labor force, the following variables are used:

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[12] Mortality figures are taken from Institute of Life Insurance, *1960 Life Insurance Fact Book* (New York, 1960), p. 110. Computations are based on the Annuity Table for 1949-male, using mortality data from the period 1939–49.

[13] The mortality function is defined in a way similar to the population function described above. For example, if mortality with respect to a group of 100,000 people now aged 65 were such that 5,000 (5 per cent) would die each year for twenty years, the function could be written $f(s) = 5{,}000$ $(0 \leq s \leq 20)$ so that $\int_0^{20} f(s)\, ds = 100{,}000$, thus accounting for the entire group. The U. S. mortality function is such that a parabola can be fitted reasonably well, and a cubic equation gives an almost perfect fit. See note 12.

$f(s)$ is a function describing the labor force whose integral over the limits from a to b gives the number in the labor force between "ages" a and b, where "age" refers not to physical age, but to the number of years for which the individuals in question have been eligible for pension coverage.

$g(s)$ is a pension coverage function giving, for each s, the per cent of the labor force "aged" s which is covered under pension plans. It is assumed to be linear and of zero slope in the present model so that $g(s) = P, 0 < P < 1$. In other words, it is assumed that the "age" structure of the covered labor force is the same as the entire labor force.

$\phi =$ the mean age (physical) at which workers become eligible for pensions, and

$\psi =$ the mean retirement age, so that $w = \psi - \phi$ is the mean number of covered years in the labor force. Then

$P \int_0^w f(s)\, ds$ gives the size of the covered labor force.

$x =$ the mean benefit payable under all pension plans,

$v =$ the median life expectancy at age ψ, the mean retirement age,

$r =$ the mean rate of return anticipated by pension managers, and

$q =$ the funding percentage; that is, the extent to which actuarially determined present values of future pension liabilities are covered by fund assets.

It is further assumed that employees' rights fully vest at the elibibility age, so that rates of disability, turnover, and death before retirement do not affect the computed volume of required funds. In the event of death or disability, accumulated funds are paid to the individual (or heirs) and disappear from the next period's required fund; the covered labor force function has been so defined that the individual likewise drops out of the required fund calculation. With respect to turnover, vesting is assumed to mean that if an individual moves from covered to non-covered employment, he is paid his accumulated balance, and properly disappears from the fund calculations, again reflected in the definition of the covered labor force function. If he moves from one covered job to another, it is assumed that his accumulated fund is transferred, thus not affecting funds in the aggregate (i.e., "portable pensions"). We further assume either that no workers move from non-covered to covered employment or that such employees become eligible for the mean benefit, giving rise to a backlog of required contributions which is fully reflected in the computed fund total.

It is also assumed that contributions are scheduled continuously at equal annual rates, there being no difference for the present model in employer-financed or jointly financed plans. Finally, it is assumed that the labor force function can be expressed as a parabola, i.e.,

$$f(s) = \alpha s^2 + \beta s + \gamma \,. \tag{18}$$

The required fund with respect to the working population, F_w, is given by

$$F_w = \frac{Pqx}{r(e^{rw} - 1)} \int_0^w (\alpha s^2 + \beta s + \gamma)(e^{rs} + e^{-rv} - e^{r(s-v)} - 1)\, ds \,. \tag{19}$$

The reader will recognize the similarity between (19) and (14); the only differences lie in the introduction of the new parameters P and q and the changed population function. Integrating and collecting terms, (19) becomes

$$F_w = \frac{Pxq(e^{-rv} - 1)}{6r^4(e^{rw} - 1)} [e^{rw}\{-6r^2(\alpha w^2 + \beta w + \gamma) + 6r(2\alpha w + \beta) - 12\alpha\} \\ + r^3 w(2\alpha w^2 + 3\beta w + 6\gamma) + 6(\gamma r^2 - \beta r + 2\alpha)] \,. \tag{20}$$

It will be of some significance that the group of terms in brackets involves only w, r, and the population parameters α, β and γ.

The fund with respect to retired individuals is

$$F_r = \frac{xq}{r} \int_0^v (1 - e^{-r(v-s)})(as^2 + bs + c)\, ds \,, \tag{21}$$

where s refers now to the number of years retired. The population function for retired workers, $h(s) = as^2 + bs + c$, is defined in such a way that $h(s)$ gives, for any s, the number covered when that particular age group reached age ψ (the retirement age). Integrating and collecting terms, (21) becomes

$$F_r = \frac{xq}{6r^4} [(e^{-rv} - 1)(12a - 6br + 6cr^2) + r^3 v(2av^2 + 3bv + 6c) \\ - 6r^2 v(av + b) + 12arv] \,. \tag{22}$$

Again it will be noted that the expression in brackets involves only r, v, and the parameters a, b, and c.

The treatment accorded (16) above, namely, taking natural logarithms of both sides and differentiating with respect to t, may be applied to (20) and (22). (20) becomes

$$\frac{1}{F_w}\frac{dF_w}{dt} = \frac{1}{P}\frac{dP}{dt} + \frac{1}{q}\frac{da}{dt} + \frac{1}{x}\frac{dx}{dt} + \frac{1}{e^{-rv} - 1}\frac{d(e^{-rv} - 1)}{dt} \\ - \frac{4}{r}\frac{dr}{dt} - \frac{1}{e^{rw} - 1}\frac{d(e^{rw} - 1)}{dt} + \frac{1}{Z}\frac{dZ}{dt} \,, \tag{23}$$

where Z is substituted for the bracketed expression. Similarly, (22) becomes

$$\frac{1}{F_r}\frac{dF_r}{dt} = \frac{1}{x}\frac{dx}{dt} + \frac{1}{q}\frac{dq}{dt} - \frac{4}{r}\frac{dr}{dt} + \frac{1}{Z'}\frac{dZ'}{dt} \tag{24}$$

where Z' is substituted for the expression in brackets in (22).

If the growth rates of x (the mean benefit) and q (the funding percentage) are known, then it may be stated that, other things equal, pension funds computed on the basis of the present assumptions will grow at an instantaneous rate which is the sum of the growth rates of x and q. Further, the portion of pension funds relating to employed workers will grow at a rate which is the sum of the growth rates of P (the coverage fraction), q, and x. The response to changes in v (median life expectancy at retirement) is likewise easily computed in the case of funds for currently employed workers; it is the simple expression given by

$$\frac{1}{e^{-rv}-1}\frac{d(e^{-rv}-1)}{dt} = \frac{-re^{-rv}}{e^{-rv}-1}\frac{dv}{dt}. \tag{25}$$

If r is 3 per cent, the required fund increases by approximately 5.3 per cent for every year added to median life expectancy. If r is 4 per cent, the corresponding figure is approximately 4.9 per cent.

The response of required funds to changes in w, r, or the population parameters cannot be stated in simple terms. Nevertheless, some indications of magnitude may be obtained by making a few computations, using empirically plausible values for all of the unknowns, varying each in turn by small amounts.

7. IMPLICATIONS FOR THE UNITED STATES

On the basis of this model, it becomes possible to make some assertions with respect to existing pension funds in the United States. The model, of course, needs some further refinement before a great deal of accuracy can be attained, yet some general conclusions may be drawn at present. The most serious shortcoming has to do with the impact of vesting provisions on required funds; nevertheless, as we shall see, there is still a great deal that can be said.

The question has frequently been raised as to the likely course of pension fund accumulations in the next ten or twenty years. Are they likely to grow at an increasing rate, a decreasing rate, or are they likely to reach a peak, followed by a period of stability or even decumulation? Answers to questions such as these may be approached on the basis of the foregoing analysis. If we should find, for example, that the mean benefit is growing at a rate of 2 per cent per year, the percentage of labor force coverage at 6 per cent, the funding percentage at 2 per cent, and median life expectancy at retirement .2 years per year, then we could assert, other things equal, that pension funds would grow at roughly 11 per cent per year.

Now the effect of little or no vesting of beneficiaries' rights gives a much smaller fund total than in the model where full and immediate vesting was assumed. If, however, there were a trend toward liberalized vesting provisions accompanying the above growth rates, then required pension funds, though starting from a lower figure, would grow at an even faster rate than the hypothetical 11 per cent.[14] If there were, at the same time, a trend toward earlier retirement and lower interest rates, the growth rate in pension funds would be larger still.

It would appear, then, that pension fund decumulation is virtually out of the question. If we make the plausible assumptions that mean benefits, coverage of the labor force, life expectancy at retirement, and extent of vesting provisions are likely to rise, not fall, then the only sources of tendencies toward decumulation would lie in the areas of retirement age, interest rates, the funding percentage, or the parameters of the population functions.

It would take more political courage than the author possesses to forecast interest rates higher than those of 1959–60, and if stock yields rise, the rise will be due, at least in part, to operations of the pension funds themselves; at any rate, the capital losses in such an event would operate to offset the benefits of higher yields. Therefore, one would hardly look for any major downward influence on required pension funds in the area of yields on investments.

Lower funds could result from a later retirement age than that prevailing at present. However, the existing state of the labor market suggests that such pressures as exist will be in the direction of earlier, not later, retirement. As evidence in this connection there may be cited the recent amendments to the Social Security Act which permit optional early retirement. We are not likely, then, to get lowered fund requirements in this quarter; indeed, there may be a tendency in the opposite direction.

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[14] The National Bureau of Economic Research study referred to in note 2 above suggests some movement toward more liberal vesting provisions in a sample of plans surveyed. See National Bureau of Economic Research, *Forty-First Annual Report* (New York, 1961), p. 52.

A few *ceteris paribus* exercises with labor force projections for 1965, 1970, and 1975 suggest that there will be no tendencies toward a peak in fund requirements from changing population parameters. This result appears to hold in spite of a modest relative decline by 1975 in the 35–44 age group, reflecting the 1930's birth rates. It does not appear that this group will decline sufficiently to reduce the total of required funds even by 1995, when the "depression babies" group will be aged 55–64, having to its credit the largest accumulated fund per individual in preparation for imminent retirement.

With respect to the funding percentage, which is the one remaining possible source of decumulation, we can only confess ignorance. We do not know to what extent pension obligations in the aggregate are funded. One might suspect a priori that the percentage would rise as past service obligations of recent plans are gradually funded. It might be observed that any diminution in the rate of coverage extension (which in itself would cause funds to grow more slowly) could be offset for a while by a more rapid "catching up" of past service obligations which arise mostly with new plans (thus raising the funding percentage, and, *ceteris paribus,* causing the funds to grow more rapidly).

One can assert with confidence, then, that pension funds will continue to grow for a long time unless there are some radical reversals of trends in the variables discussed above. It should be possible to make even more precise predictions as to future growth rates by projecting the course of the relevant variables in the last model, and by estimating the effects of trends in vesting provisions.[15]

Another question raised by pension fund operations is that of the impact on aggregate saving. Not surprisingly, pension saving has become a significantly large part of total net saving in the United States, as indicated by Table 4.

If one omits from consideration the years 1947 (when non-coerced personal saving virtually vanished in the rush to buy newly available goods) and 1949 (when total personal saving fell more than in other

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[15] It is interesting to note that researchers in the National Bureau study had first entertained the possibility of a point of decumulation. See National Bureau of Economic Research, *Fortieth Annual Report* (New York, 1960), p. 46. The most recent reference to likely growth rates indicates findings consistent with the conclusions stated here; namely, continued accumulation for the coming twenty years (the period under consideration) with annual asset increments increasing in absolute amounts *throughout the period.* See the *Forty-Second Annual Report,* p. 63.

Table 4. Net Saving, Personal Saving, and Saving Through Pension Funds, 1946–59 (*in billions of dollars*)

Year	Total net saving	Personal saving[a]	Pension Saving	
			Amount	Percentage of personal saving
1946	19.9	14.2	1.6	11.3
1947	23.9	5.7	2.2	38.6
1948	30.3	12.2	2.5	20.8
1949	15.7	9.8	2.8	28.6
1950	29.4	14.2	3.3	23.2
1951	33.3	19.4	3.8	19.6
1952	24.3	20.7	4.4	21.3
1953	20.5	21.4	4.3	20.0
1954	18.9	20.4	4.5	22.1
1955	30.5	19.3	5.1	26.4
1956	35.8	23.4	5.6	23.9
1957	32.8	25.6	6.1	23.8
1958	19.5	27.1	6.9	25.5
1959	30.9	26.3	7.9	30.0

Sources: U. S. Department of Commerce, *U. S. Income and Output* (Washington, D. C., 1958); *Survey of Current Business*, May, 1961; Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin*, selected issues.

[a] Personal saving figures have been adjusted to reflect rising equities in government-managed retirement funds other than the OASDI funds.

recession years) pension saving shows a mixed though generally rising trend as a percentage of personal saving, and a steady growth, interrupted only once, in absolute terms. If, as we have hypothesized above, pension saving tends to increase total personal saving, other things equal, the figures for recent years ought to reflect this trend. Surprisingly, personal saving as a percentage of personal income or disposable income shows very little change in the last ten years. The author proposes an explanatory hypothesis which admittedly has little empirical support at present, but which at least appears to warrant discussion. It is quite possible that potential saving as a percentage of full employment income has increased as a result of pension saving, without any observable increase in realized saving as a percentage of realized personal income. The economy has operated at less than full employment of labor and capital for the last five years; quite possibly a pension-induced upward shift in the savings function has been at least partly responsible. Were output and income to rise to full employment levels, aggregate saving might easily rise as a percentage of personal or disposable income.

Still another question posed by the existence and rapid growth of pension funds has to do with the capital markets. Non-insured pension funds became in 1959 the largest net purchasers of stocks in the United States and retained that position by a widened margin in 1960. They are also among the important buyers of corporate bonds, absorbing 22 per cent of 1960 net issues. Relative yields of stocks and bonds then, are strongly influenced by the decisions of pension fund managers. One might even speculate that the demand situation for bonds and stocks which has produced the reverse yield pattern in recent years is largely due to the investment behavior of non-insured pension funds. Heretofore there were no operations of similar size by financial intermediaries in the stock markets, except possibly those of investment companies or mutual funds (which reflect indirectly the investment preferences of individuals) . Indeed, one might speculate a bit further and advance the hypothesis that recent efforts to reduce long-term interest rates (or more broadly, long-term rates of return on wealth) , only modestly successful in the bond and mortgage markets, have had their greatest effect in the stock markets. Federal Reserve and other policy measures may have abetted the effect of pension fund operations in driving down stock yields through a complex operation of fund shifts between sectors in the economy. After all, interest rates are only a part of the whole structure of rates of return on wealth, which structure in its broadest context includes all property incomes. Monetary policy affects all of these rates of return, not just interest rates, narrowly defined.

Further research into the role of pension funds in our present-day economy would appear to be necessary. We need a broad sampling of pension plans in order to estimate mean benefits, eligibility and retirement ages. We need to know more about vesting provisions and means of introducing such information into the functions describing pension funds. We need to know more about funding practices and trends in funding percentages. Some of these matters are already under investigation at the National Bureau of Economic Research and elsewhere; others remain to be explored.

It is safe to say, at least, that pension funds have already reached a size that justifies research currently in progress. The indications are that their rapid growth will continue, and their operations will attract the increasing attention of economic investigators in business, the universities, and government.

Joseph J. Spengler
Juanita M. Kreps

VI. EQUITY AND SOCIAL CREDIT FOR THE RETIRED

Old age is a general mutilation. It has all the limbs and organs, but they each lack something.—Democritus

Not the mal-expenditure of incomes, but the mal-receipt of them, is the fact fundamental to present practical evils.
H. J. Davenport

The equitable is just.—Aristotle

Our concern in this essay is primarily with the equity aspect of the economic situation of older people who are no longer full-time members of the labor force. This concern is of importance largely because of the persisting threat of inflation and because of the denial of the fruits of technical progress to many of the aged.

The seriousness of the equity problem is accentuated, of course, by other changes under way. Three in particular are worthy of notice. First, as Margaret Gordon has remarked, "the ratio of workers to nonworkers in the aged population will continue to diminish" as it has in the past 60 years. Today only about one person in five among those aged 65 and over (or about half the proportion obtaining in 1900) is in the labor force; and in the future the proportion will be lower still.[1] The income position of older members of our society may therefore become more vulnerable to inflation and related effects.

Second, because of the prolongation of postretirement life, the time interval during which the aged are exposed to influences adverse to equity is somewhat longer than formerly, for individuals retire earlier and live longer than in the past. As a result, the ratio of postretirement life expectancy to work-life expectancy for males aged 20 has already risen about one-seventh since 1940. White-male life expectancy is about one-eighth higher than it was about 1900; and it could easily be increased another eighth through decrease in mortality from cardio-vascular-renal diseases and malignant neoplasms. White males aged 65 might then live an average of 14–15 more years, instead of about 13 more as now, and white females might live an average of 16–17 more years, instead of about 15.5 more as now. Third, while individual consciousness of being physically old appears to emerge much later now than in the time of Democritus or in that of George Washington, the dynamic character of modern technology tends to depreciate the value of that experience which accumulates with age, and hence serves both to reduce the self-esteem of older persons and to accentuate the psychic costs which accompany aging.[2] The aged may therefore now feel greater psychic need of material comfort to counterbalance loss of status or prestige.

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[1] "Work Patterns of Retirement," in R. W. Kleemeier, ed., *Aging and Leisure: A Research Perspective into the Meaningful Use of Time* (New York, 1961), pp. 17–27, 47.

The first part of this essay describes the economic experience of the aged during the past 20–25 years. The second has to do with the major sources of inequity for the aged. The final part treats of measures whereby the aged may be assured more equitable participation in the fruits of a technologically progressive economy.

1. THE AGED'S SHARE IN THE NATIONAL PRODUCT

The data relating to the economic position of the aged indicate that despite an absolute improvement in their lot in recent decades, there remains a need of much further improvement. Although the data presented below provide an incomplete picture of the position of the aged, they indicate nevertheless that the incomes which the aged derive from work, pensions, and property commonly fall far short of that to which their class membership has accustomed them. We shall review, in order, the aged's income position, the changing composition of their income, and their capacity to cope with inflation. Throughout this discussion our primary concern is with the changing ratio of per capita income of the aged to per capita income in the nation as a whole, and with the fact that the probable decline in the aged's employment prospects will further worsen their relative economic position. The extreme vulnerability of older persons to the income-eroding effects of inflation is also noted.

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[2] Recently René Dubos observed: "The experience of the father is no longer of much use to the son." See his "Man Versus Environment," in H. F. Vaughan, ed., *Proceedings of the Second Congress on Environmental Health* (University of Michigan School of Public Health, Ann Arbor, 1961), p. 9. With this one may compare what Robert Greene wrote in 1592 of a gentleman "whose deepe step into age deciphered his experience, and whose grauitie in speeche reported his discretion." See *The Thirde & Last Part of Conny-Catching* (facsimile edition; London, 1923), p. 9.

a. *The Income Position of the Aged*

Both data relating to individuals and data relating to families indicate that persons aged 65 or more years usually are worse off than persons and families in lower age groups.

(1) *Money income of individuals and families.* According to Bureau of the Census data for 1960, 52.7 per cent of the nation's noninstitutionalized *persons* aged 65 and over had less than $1,000 money income; 23.7 per cent had between $1,000 and $2,000; 10.2 per cent had between $2,000 and $3,000; only 13.5 per cent had $3,000 or more. The median income for all aged persons ($950) was about one-sixth below that ($1,150) for all income recipients. The economic position of aged women was quite inferior to that of aged men. The median income of women 65 and over was only $640 with almost three-fourths receiving less than $1,000, while that for aged men was $1,620, with somewhat more than one-fourth receiving less than $1,000. As will be indicated below, the lowness of these averages is associated with the fact that so few older persons remained in the labor force; the medians for aged men and aged women, respectively, who worked full-time the year around were $4,120 and $2,840.[3]

Incomes are lower among both older members of families and older individuals than among their younger counterparts. Relevant data relating to families are tabulated in Table 1. The median income of *families* headed by persons aged 65 and over was $2,897, or but half that ($5,905) of families headed by persons under 65. Moreover, nearly one-third of these families received less than $2,000 whereas

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[3] See Lenore A. Epstein, "Sources and Size of Money Income of the Aged," *Social Security Bulletin,* 25 (1962), p. 17, and Bureau of the Census, *Current Population Reports, Consumer Income,* Series P-60 (37), especially pp. 10–11. See also *Basic Facts on the Health and Economic Status of Older Americans,* a Staff Report to the Special Committee on Aging, U. S. Senate (Washington, 1961).

Table 1. Total Money Income of Families with Head Aged 65 and Over and Head under Age 65, by Size of Family, 1960 (Noninstitutional population of the United States)

		Families containing			
Characteristic	All families	2 persons	3 persons	4 persons	5 or more persons
Median money income of family:					
Head 65 and over	$2,897	$2,530	$4,122	$6,100	$5,727
Head under 65	5,905	5,314	5,930	6,300	6,074
Percentage of families with income of:					
Under $2,000					
Head 65 and over	31.4	35.7	20.3	17.6	17.9
Head under 65	10.2	16.0	9.0	6.5	8.9
$7,000 and over:					
Head 65 and over	16.4	11.5	23.5	41.4	37.9
Head under 65	37.1	31.1	37.8	41.0	38.8
Percentage distribution by size:					
Head 65 and over	100.0	72.9	16.4	5.1	5.6
Head under 65	100.0	26.4	21.6	22.9	29.1
Average (mean) size:					
Head 65 and over	2.5	2.0	3.0	4.0	6.4
Head under 65	3.9	2.0	3.0	4.0	6.2

Source: Lenore A. Epstein, "Sources and Size of Money Income of the Aged," *Social Security Bulletin,* 25 (1962), p. 16.

only one-tenth of those with heads under 65 had incomes of less than $2,000; and only 16.4 per cent had incomes of $7,000 or more, whereas 37.1 per cent of those with heads under 65 had incomes of this size. The median income of the 3.7 million unrelated individuals aged 65 and over ($1,053) was much below that ($2,571) for younger unrelated persons; it was appreciably higher for aged males ($1,313) than for aged females ($960). Moreover, while 97.7 per cent of the aged unrelated males and 94.4 per cent of the aged unrelated females had income, one-third of the former and one-half of the latter had less than $1,000. Among aged males (but not among aged females) the median income for unrelated individual income recipients ($1,335) was below that ($1,798) for individual income recipients who were members of families. Aged persons who lived with relatives usually had lower incomes than those who lived in their own households.[4]

Data obtained in the Census of 1960, some of which are presented in Table 1, indicate that it is in the smaller families that one finds

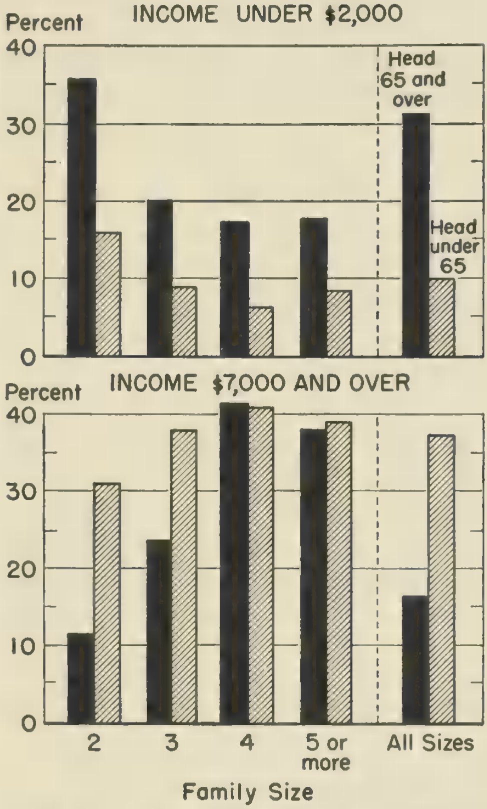
[4] On individuals see pp. 10–11 of census report cited in note 3; also *Basic Facts,* p. 17.

the greatest difference in per capita income between families with heads under age 65 and families with heads aged 65 and over. The difference is negligible in families with four or more members, in part because even in those with older heads several persons may be receiving income. The mean size of families with heads under age 65 is larger (3.9) than is that (2.5) of families with heads 65 and over; 72.9 and 16.4 per cent, respectively, of the families with heads 65 and over number only two and three members, whereas 26.4 and 21.6 per cent, respectively, of families with younger heads fall in the two- and three-member categories. The income disparity found at the two- and three-member family levels is greater because the number of full-time workers per family is much lower in families with heads 65 and over than in families with younger heads. In families of four or more members the corresponding difference in number of earners is much less notable. Per capita income (as measured by dividing median family income by family size) varies somewhat differently with family size in younger than in older families. In families with heads under 65, per capita income is highest in two-person families and thereafter declines with family size. In families with heads 65 and over, per capita income is appreciably higher in three- and four-person families than in families with either two members or five or more members.

A comparison of the number of families reporting less than $2,000 (and over $7,000) by age of head and family size is provided in Figure 1, below. For each family size, the proportion of older families reporting under $2,000 was at least twice as high as the proportion of younger families. A $7,000 or over income was reported about three times as frequently by younger two-person families as by older two-person families. Younger three-person families reported incomes of $7,000 or more about 50 per cent more often than older three-person families. For larger families there were no differences in the proportions of the two groups reporting these higher incomes.

The data presented indicate that the difference between the median income of families with head 65 and over and that of families with younger heads is attributable only in part to differences in family size. The part of the variation that is attributable to such differences may, however, be stated in more summary form than has been done. When each of the two age groups was standardized for family size (though not for age composition, etc., of family mem-

Fig. 1. Money income of families headed by persons aged 65 and over and under age 65, by family size, 1960.



Source: Lenore A. Epstein, "Sources and Size of Money Income of the Aged," *Social Security Bulletin,* 25 (1962), p. 17.

bers), "the median income of families headed by persons 65 and over was found to be about seven-tenths that obtained for families with heads under 65. When this ratio is compared with the corresponding relationship that actually prevailed in 1960 (one-half), it appears that only about two-fifths of the percentage gap in the average incomes of the two broad age groups represented differences in family-size structure. The remainder reflected actual income disparities between the two age-groups within family-size categories."[5] Two circumstances appear to be primarily responsible for these income disparities: (*a*) the number of earners per family is greater among families with heads under 65 (perhaps 1.75 or more per family of 3.9 persons) than among families with heads 65 and over

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[5] See p. 7 of census report cited in note 3.

(0.9–1.0 per family of 2.5 persons), largely because 97 per cent of the former and only 64 per cent of the latter include one or more earners; (*b*) the median income of older employed family heads was about three-eighths lower, in major part because they usually earned less in a given occupation than did younger family heads, and in lesser part because relatively more older heads were in lower-income occupations.[6]

(2) *The aged and the distribution of the national product.* While the absolute economic position of the aged is better today than it was 20–25 years ago, the relative economic position of many of the aged has deteriorated. Since the incomes of persons who have remained in the labor force have generally more than kept pace with price rises, those aged who have continued to derive all or most of their income from current earnings have approximately maintained their economic position. This is seldom true, however, of the 55 per cent of the aged who derive what income they have largely or wholly from sources other than earnings, for that portion of their income which is based on past earnings has risen unevenly and unpredictably, being dependent upon Congressional action. For example, OASDI benefits remained unchanged throughout the 1940's, with the result that a man who retired in 1940 received the same number of dollars in 1949 as in 1940, even though these dollars bought only about three-fifths as much as they did when he retired. During the 1950's, however, upward adjustments in benefit payments slightly exceeded the upward movement of the Consumer Price Index.

The relevant question, of course, is not whether the aged's incomes have risen sufficiently to offset the rise in prices and the cost of living, but whether older people are sharing adequately in the fruits of economic growth and the resulting increase in the nation's output. The evidence indicates that, since the end of World War II, increases in the incomes of the aged have been smaller than those received by the rest of the population. Between 1947 and 1952 the aggregate income of persons aged 65 and over rose slightly more rapidly than did aggregate income for the population as a whole; yet in the same period the aged population increased 17 per cent, whereas the population 14 and over increased only 5 per cent. The increase in income per person aged 65 or more (about 29 per cent) fell short of the increase (about 31 per cent) in income per person aged 14 or more. So while the absolute income position of the average aged person improved between 1947 and 1952, it improved somewhat less than that of the younger adult.[7]

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[6] *Ibid.*, pp. 8–9.

The relative income position of the aged continued to deteriorate in the 1950's. According to Bureau of the Census data, the median income for family units headed by persons aged 65 or over was 30.8 per cent higher in 1957 than in 1950. During this same period, 1950–57, however, the median for all family units increased by 49.8 per cent and that for families headed by persons in the age groups 25–34, 35–44, and 45–54 increased by 51 per cent or more. The relative position of aged unrelated individuals remained about the same during this period; their median income rose by 42.1 per cent (from $646 to $918) while that for all unrelated individuals increased by 43.2 per cent (from $1,045 to $1,496). Since the ratio of families to unrelated individuals is about 2 to 1, the net effect is a significant decline in the relative income position of the aged as a whole.[8]

Table 2. Median Income of Men, by Age, for the United States: 1959 and 1949 (*in current dollars*)

			Index (35 to 44 years = 100)	
Age	1959	1949	1959	1949
Total	$3,996	$2,346	75	79
14 to 24 years	1,131	1,112	21	38
14 to 19 years	411	410	8	14
20 to 24 years	2,612	1,726	49	58
25 to 34 years	4,747	2,754	89	93
35 to 44 years	5,320	2,951	100	100
45 to 54 years	4,852	2,751	91	93
55 to 64 years	4,190	2,366	79	80
65 years and over	1,576	1,016	30	34

Source: Bureau of the Census, *Current Population Reports, Consumer Income*, Series P-60, No. 35, p. 7.

Variations in income and income-growth, by age groups, have been summarized in Census data relating to 1949–59 and reported in Table 2. In 1959, the median income of men aged 35–44 years was $5,300, or about one-tenth higher than the corresponding averages for men 25–34 years old ($4,700) and men 45–54 years old ($4,900). Lower median incomes were reported for younger men (most of whom were just starting their working lives) and for older men, many of whom had retired from the labor force. The average income of males aged 20–24 was only about one-half that of males aged 35–44, while the median income for males aged 65 and over was only about 30 per cent as high as that for males aged 35–44.

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[7] Jacob Fisher, "Postwar Changes in the Income Position of the Aged," *Social Security Bulletin* (1954).

[8] Sidney Goldstein, *Consumption Patterns of the Aged* (University of Pennsylvania, Philadelphia, 1960), p. 40.

A cohort approach may be employed to summarize the impact of 10-year "aging" upon the progress of average income. The relevant data are tabulated in Table 3. Median income figures for 1949 and 1959 have been arranged in order of the period of birth of the income recipients. Comparison of the 1949 and 1959 figures reveals that the largest percentage income increases were experienced by the youngest cohort, largely because its members were achieving what amounted to "occupational adulthood"; percentage increases for older cohorts were negatively associated with age. More specifically, the median income of males born between 1925 and 1935 (who were 15–24 in 1949 and 25–34 in 1959, a decade later) quadrupled between 1949 and 1959, while that of the next cohort (born between 1915 and 1925 and aged 25–34 in 1949) had almost doubled by 1959, when they had attained 35 to 44 years of age. The two cohorts next in age (35–44 and 45–54 in 1949 and 45–54 and 55–64 in 1959) experienced increases of about two-thirds and one-half, respectively, in their median incomes between 1949 and 1959. In contrast with other cohorts, the oldest cohort (born in 1895 or ear-

Table 3. Median Income of Men in 1959 and 1949, by Period of Birth, for the United States (*in current dollars*)

Period of birth	Median income in 1959	Median income in 1949	Percent change, 1949 to 1959
April, 1925, to March, 1935	$4,747	$1,112	+327
April, 1915, to March, 1925	5,320	2,754	+ 93
April, 1905, to March, 1915	4,852	2,951	+ 64
April, 1895, to March, 1905	4,190	2,751	+ 52
March, 1895, and earlier	1,576	1,710	− 8

Source: Bureau of the Census, *Current Population Reports, Consumer Income*, Series P-60, No. 35, p. 8.

lier and made up of men 55 and over in 1949 and 65 and over in 1959) suffered a decline of 8 per cent in median income during the decade.

b. *Changing Composition of the Aged's Income*

As has been suggested, the decline in the relative income position of the aged is associated with the composition of the sources whence they draw income, for older persons derive income decreasingly from current wages and increasingly from benefits based predominantly on earnings from previous employment. In 1960, for example, the income which persons aged 65 and over drew from current employment was between ten and eleven billion dollars, or approximately equal in amount to what recipients of old-age, survivors, and disability insurance, together with retired government and railroad employees, were drawing from these sources of benefits. By contrast, the aggregate earnings of the aged only a decade earlier had amounted to several times the amount distributed in the form of benefit payments. Even as late as 1958 the aged's currently earned income, approximately ten billion dollars, significantly exceeded their aggregate benefit receipts based upon previous employment by two or three billion dollars.[9]

Income accruing to most aged persons from the ownership of assets is apparently quite low. Of the 8 million spending units (defined as "all persons living in the same dwelling and related by blood, marriage or adoption, who pool their incomes to meet major expenses"), with head aged 65 or more, 29 per cent had no liquid assets (U. S. savings bonds, checking and savings accounts in banks, and shares in savings and loan associations and credit unions) ; 17 per cent had $500 or less; 21 per cent had $500 to $2,000; 33 per cent had $2,000 or more, according to the 1959 *Survey of Consumer Finances.* The median liquid asset value for all spending units with an aged head was just over $700; the median for all spending units with an aged head with holdings was about $1,800. Among the spending units with aged heads, liquid asset ownership was correlated closely with income. While corporate stock and bond holdings were not covered by the survey, it is doubtful that their inclusion would have greatly increased the median liquid asset values reported.

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[9] Lenore A. Epstein, "Money Income of Aged Persons, Mid-1960," *Social Security Bulletin,* 24 (1961).

Equity in a home represents the major portion of the net worth reported by older people. In 1959 two-thirds of all non-farm families with head aged 65 or over owned their homes, and 83 per cent of these homes were free of mortgage debt. Of the OASDI beneficiaries surveyed in 1957, more than two-thirds of the couples, nearly half of the widows, and one-third of the other aged persons owned their homes; 87 per cent of these homes were mortgage-free. The median equity reported in an owned home was $8,360 for retired couples, $6,100 for single retired workers, and $8,090 for aged widows.

The median value of all assets (exceeding debt) held by these OASDI beneficiaries surveyed in 1957 was only $4,920. Beneficiary couples (both husband and wife entitled to benefits all year) had a median asset value of $9,620, single retired workers a median asset value of $1,270, and aged widows a median asset value of $4,380.[10]

The change in the composition of the income of the aged is of two-fold origin: the maturing of the social security system and the secular decline in the labor-force participation rates of older men. Between 1890 and 1940 the labor-force participation rate for men aged 65 and over declined from about 70 per cent to about 40 per cent. Except for a temporary rise in this rate occasioned by a sharply increased demand for labor during World War II, labor-force participation rates for males 65 or over have continued to decline. Whereas in 1945, 51 per cent of all males aged 65 and over were in the labor force, only 45 per cent were enrolled in 1950 and only 36.7 per cent in 1957. By 1960 this percentage had become 32.3, or less than half the rate reported in 1890.[11]

In the absence of a reversal of this long-run decline in the labor-force participation rates of older men, the economic position of the aged will continue to reflect effects of the consequent drop in the fraction of their income derived from current wages and salaries. Such a reversal seems unlikely, at least in the near future. It might result, given an adequate aggregate demand for labor, if vesting provisions were generally incorporated in pension plans, and if steps were taken to remove remediable barriers to the mobility and economic employability of older workers.[12] Of probably greater importance, however, is the incidence of automation, together with a continuing high rate of female labor-force participation and a steady rise in the number of young potential entrants into the labor force. It is quite possible, therefore, that the demand for the services of older workers will decline even further. This tendency is likely to be accentuated by changes in the Social Security Act which permit men to retire at the age of 62, and by the adoption of other measures designed to reduce the extent to which older persons participate in the labor force. In consequence, wages and salaries will contribute decreasingly to the income of the aged, with the result that the problem of insuring that the aged share equitably in a growing national product will become even more difficult.

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[10] These facts on the income and asset position of the aged, summarized in Juanita M. Kreps, "Aggregate Income and Labor Force Participation of the Aged," *Law and Contemporary Problems,* 27 (1962), are taken from the following sources: *Federal Reserve Bulletin* (1959), pp. 1107, 1110; *Background Paper on Income Maintenance* (1960), pp. 16–20, 79–82; and *Basic Facts on the Health and Economic Status of Older Americans, op. cit.,* pp. 20–23.

[11] U. S. Department of Labor, *Population and Labor Force Projections for the United States, 1960 to 1975,* Bulletin No. 1242, 1959, and Robert L. Stein and Herman Travis, "Labor Force and Employment in 1960," *Monthly Labor Review,* 84 (1961), p. 349.

c. *Inflation and the Aged*

Post-1940 price inflation affected diverse groups differently. No group has been more adversely affected, however, by the rise in prices than have the aged. Rising prices have eroded their accumulated savings and reduced the value of their social-security and other retirement benefits. Meanwhile, prolongation of the post-retirement life of those withdrawing from the labor force has accentuated the adverse impact of inflation. For increasingly workers not only live longer but also retire earlier, whether voluntarily or for other reasons. Thus they must live more years on a given and relatively fixed retirement accumulation. To illustrate: at age 60 in 1900, a man could expect to spend less than 3 years in retirement; today he can expect to spend more than 8 years in retirement. He must therefore spread his accumulated savings over a period approximately three times as long as was required in 1900.

Whether the prices of collections of goods and services typically purchased by the aged have risen more rapidly than have the prices of goods and services purchased by other age groups is not determinable with any degree of accuracy.[13] Inflation has served especially to swell the cost of medical care, not the most important object of expenditure on the part of the aged but still a significant one. Outlay upon such care absorbs something like 7–8 per cent of the expenditure of persons 65 and over, a decidedly larger fraction of their expenditure than that of younger persons. In 1957–58 persons aged 65 and over spent 86 per cent more per capita for medical care than did other persons: $177 per older person as compared with $94 per person for the general population.[14] This differential has been increasing in part as a result of the tendency of the cost of medical care to rise much faster than living costs in general. Between 1947–49 and 1961 the cost of medical care, as reflected in the Consumer Price Index, increased 61 per cent, whereas the cost of all items rose only 28 per cent. This increase was greater than that of any other major component of the index, exceeding that for housing (33 per cent), rent (44 per cent), and personal care (34 per cent). Some elements that enter into the index of medical care have improved in quality, of course, and some (e.g., hospital rooms, the rates on which have about doubled) include more comprehensive service than formerly. Even so, this upward movement is continuing, the index of medical care having increased 21 per cent in 1956–61 while that for all items rose only 10 per cent.

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[12] See A. M. and J. N. Ross, "Employment Problems of Older Workers," in *Studies in Unemployment*, prepared for the Special Committee on Unemployment Problems, U. S. Senate, 86th Congress, 2nd session (Washington, 1960), pp. 97–120.

[13] For a comprehensive study of consumer expenditures by age group, see Sidney Goldstein, *op. cit.* The Health Information Foundation (New York) has published a number of studies and reports on the expenditures for medical services and on the capacity of individuals and families, among them older persons, to meet these expenditures. See in particular *Progress in Health Services*, 8–10 (1959–61), and Nos. 14 and 17 in the Research Series, namely, O. W. Anderson *et al.*, *Family Expenditure Patterns for Personal Health*, and Ethel Shanas, *Meeting Medical Care Costs among the Aged*, both published in 1960.

Health insurance has cushioned the incidence of these rising medical costs upon older persons only slightly, for health insurance coverage for the aged remains quite limited, despite recent improvements. Household surveys indicate that only 46 per cent of all persons aged 65 and over have hospitalization insurance. This figure is much lower than the 67 per cent reported for the total population (or 72 per cent of persons of all ages, according to the estimate of the Health Insurance Council). Furthermore, in 1957–58 benefits usually constituted only a minor fraction of total medical costs. In view of the fact that so large a proportion of the aged do not carry hospitalization insurance and that their medical needs are both great and continuing to rise in monetary cost, it is quite likely that this component of the budget of the aged will continue to be affected more adversely than other items of expenditure unless the medical care of the aged is subsidized by the state.

In summary, the relative economic position of the aged has deteriorated during the past twenty-five years largely because of their inability to remain in the labor force. Being on fixed and non-equity incomes, older persons are also peculiarily susceptible to inflationary price movements. For much the same reasons, as we shall demonstrate in the section which follows, their income sources are not likely, in the future, to permit the aged to share in the fruits of technical progress.

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[14] Health Information Foundation, *Progress in Health Services,* 9 (1960), and 8 (1959).

2. FOUNDATIONS AND TRENDS

Having reviewed the recent tendencies in the movement of the economic position of the aged, we shall examine in this section the abstract factors and circumstances which condition the absolute and the relative economic position of the aged. We shall also attempt to estimate which of these tendencies will prove dominant, at least in the absence of compensatory action on the part of the state.

a. *Movement of Output*

Over the past 70 years real output per man-hour of work has increased between 2 and 2.5 per cent per year. In recent years, moreover, this rate of increase has risen. Since World War II real output per man-hour in the private sector has risen between 3 and 3.5 per cent per year, largely as a result of the increase in capital employed per man-hour, together with greater investment in education and research and further increase in efficiency in the use of the nation's resources. A somewhat lower rate of increase has characterized the governmental sector (given conventional measures of output and input) and the national economy as a whole. Output per capita rises less rapidly than output per man-hour, however, because in recent years the fraction of the population enrolled in the labor force has fallen (after having risen slightly until about 1940), and because the average number of hours worked per year by members of the labor force has fallen for over 70 years. As a result, national consumption per capita has increased only about 1.8 per cent per year. Furthermore, between 1950 and 1961 per capita disposable income and personal consumption increased only about 1.5 per cent per year.[15]

As has been suggested, the movement of output per man-hour is an imperfect indicator of the past and the prospective performance of the American economy in that it implicitly exaggerates the role of labor and neglects changes in the composition of the labor force. If a highly paid man-hour of work counts for more than a low-wage man-hour, physical output per man-hour in the private sector increased only about 2.0 per cent instead of about 2.4 per cent per year over the 70-year period beginning in 1889. Furthermore, the capital-labor ratio continued to rise, capital per unit of labor-input increasing about 1 per cent per year. Finally, when allowance is made for the growth of both labor and capital inputs, about half the growth in aggregate output over the past 70 years is still unaccounted for; this unexplained residuum was contributed by improvements in productivity per unit of input made possible by technical progress and better organization.[16]

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[15] See J. W. Kendrick, *Productivity Trends in the United States* (Princeton, 1961), chap. 3 and S. Fabricant's introduction, esp. pp. xxxvii–xliii.

b. *Distribution of the Fruits of Progress*[17]

In the absence of inflation (as indicated by an upward movement in the money value of a given gross national product or of some other adequately representative collection of goods and services), the fruits of technical and related progress may be distributed principally in two ways. They may be distributed, first, by allowing the prices at which goods and services are sold to fall in the same measure as their unit costs of production fall. Under this arrangement the benefits of progress are diffused to everyone inasmuch as everyone is a consumer. The real incomes of workers, of suppliers of capital and entrepreneurial services, and of receivers of pensions and retirement and related benefits rise primarily because of increases in the purchasing power of their money incomes. In this case the money incomes of individuals would remain essentially unchanged except for modifications occasioned by changes in the comparative scarcity of various factors of production (or inputs), in the differential incidence of aleatory events, and in the progress of individuals up or down the occupational ladder.

This mode of diffusing the fruits of technical progress has not had much support[18] nor has it been effective in practice. In the past it has been protested that such a method of distribution favored the creditor class (i.e., lenders, pensioners, and others) at the expense of the active class (i.e., entrepreneurs, wage-earners, salaried workers) and of governmental and other borrowers or debtors. It was also argued that this mode, because it entailed continually falling prices in a dynamic economy, accentuated tendencies to unemployment and retarded economic progress.[19] The latter argument was given a more modern form as it came to be recognized that, in the absence of expansionary monetary policies, full employment would be assured only if wages and prices were completely flexible, and that such flexibility was not likely to prove realizable.

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[16] *Ibid.*, pp. 60–65, 85–86.

[17] The course of the argument and some of the wording in this and the next subsection follow that employed in J. J. Spengler, "Wage-Price Movements and Old-Age Security," in I. L. Webber, *Aging: A Current Appraisal* (University of Florida Institute of Gerontology, Gainesville, 1956), esp. pp. 110–116.

[18] Its merits are discussed by E. G. Nourse, who favors the distribution of a large fraction of the gains of progress in the form of lowered prices. See his *Price Making in a Democracy* (Washington, 1944).

The fruits of progress may be distributed, secondly, by holding the general price level comparatively constant and at the same time allowing the money income of those receiving wages, salaries, profits, and rent to rise sufficiently to maintain a suitable balance between the value of output and the sum of the money incomes paid out. Under this arrangement all persons on fixed incomes would virtually be denied a share in the fruits of technical progress, and suppliers of capital would be permitted to participate, on the basis of past investments in effect, only in so far as they held equities rather than claims to fixed amounts. This mode of diffusion entails an increase in bank credit and money roughly commensurate with output, it being supposed that the increments in the money supply will be used to purchase labor and commodities and make full employment possible. Controversy respecting what other conditions are essential to the realization of this desired outcome lies outside the subject of our discussion, as does the determination of what constitutes the most appropriate monetary policy. Our concern here is merely with the incidence of different price movements upon the capacity of the aged to share in the fruits of technical progress and other sources of income growth. We have shown that the aged do share under a regime of falling prices, though not notably under a regime involving a constant instead of a falling general price level.

c. *Labor Standards Versus Monetary Standards*

It used to be supposed that, in the absence of war or of governmental intervention, economies were more subject to deflationary than to inflationary tendencies, even though history was replete with accounts of the activities of power-seekers who had dissipated the value of current media of exchange. Although the level of prices often rose in the age of hard money, it did not become quite free to rise until modern monetary and banking systems came into effective being. Given these systems, however, the level of prices tends to move upward when the monetary demand for goods and services at current prices persistently exceeds their supply, growth of which is checked by emerging physical and institutional bottlenecks. It also moves upward when those who determine costs and selling prices can count upon having their decisions underwritten by the monetary authorities in the event that such action is considered essential to the maintenance of employment.

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[19] Both objections were discussed by A. H. Hansen in his *Economic Stabilization in an Unbalanced World* (New York, 1932), chaps. 18–20, 24. See also J. M. Keynes, *A Treatise on Money* (New York, 1930), vol. 2, chap. 30, on the supposedly adverse effects of falling prices.

In the past three decades, gold and other monetary standards have largely given way, as Hicks suggests, to a Labor Standard.[20] Formerly, the general level of wages had to be compatible with the monetary conditions underlying the monetary framework within which this level was determined. Unemployment was likely to arise, therefore, when a discrepancy developed between "the actual wage-level and the 'equilibrium wage level.' " Today the monetary system has become much more elastic than it used to be. It can therefore be adjusted to changes in wages, whereas in the past wages had to be accommodated to the monetary system. Today "monetary policy adjusts the equilibrium level of wages so as to make it conform to the actual level," with the result that not much unemployment is allowed to arise from the emergence of a discrepancy between the actual wage-level and the level that the monetary system can support. The money system is stretched until it fits the actual wage system. Whence, as Hicks puts it, "we are on a Labour Standard." [21] For some years we have had evidence of this change in standards in the United States; the degree in which prices have been proving resistant to downward pressure has been highly correlated with the proportion outlays for labor formed of these prices.[22]

When an economy is on a Labor Standard, a number of circumstances operate in combination to produce inflation. The presence of powerful trade unions serves to prevent downward adjustments in money wages; and the wage rigidity resulting, together with such comparative price rigidity as flows from oligopolistic and related market situations, diminishes or prevents downward adjustments in many product prices. The presence of these unions is also conducive to the upward movement of money prices, especially if monetary demand rises in some sectors of the economy, or if some industries experience improvements in output per worker much in excess of the average rate of such improvement. For then the favorably situated industries can acquiesce in absolute and relative wage-rate increases that exceed the rate at which output per man-hour in the economy as a whole is advancing and yet enjoy relatively high profits, at least so long as the prices charged are not permitted to decline significantly. Meanwhile, other industries feel the impact of the expansion and the price changes taking place in the favorably situated industries. They will experience some increase in demand for their own products, especially if the favorably situated industries increase some of their prices. Of greater importance, as we indicate in the next paragraph, firms in the less favorably situated industries will be subjected to wage demands by their employees, to demands somewhat in keeping with the increases which the favorably situated workers have obtained, even though these increases are often in excess of the increases in output per man-hour experienced in the less favorably situated industries. Acquiescence in these demands therefore entails price increases on the part of some of the less favorably situated industries, with the result that the over-all price level may rise. If the available money supply does not suffice to sustain the required increases in prices, together with adequate profits, some unemployment will result and will probably persist until the state intervenes with expansionist monetary and fiscal measures and thereby raises prices and reduces real wages.

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[20] J. R. Hicks, *Essays in World Economics* (London, 1959), pp. 87–88. See also S. H. Ruttenberg's comments in Kendrick, *op. cit.*, pp. 224–227.

[21] Hicks, *op. cit.*, pp. 87–89.

[22] See Richard Ruggles, "The Nature of Price Flexibility and the Determinants of Relative Price Changes in the Economy," in G. J. Stigler, ed., *Business Concentration and Price Policy* (Princeton, 1955), pp. 441–505.

If the rate of increase in real wages, which trade unions seek and the state endorses, is incompatible with the increase in output per man-hour that capital formation and technical progress are making possible, a self-perpetuating inflationary process of the sort described by Lerner could be set in motion. It could have origins in excess demand as well as in rising costs. Sellers might put up their prices to offset the cost increases occasioned by the wage increases; and in time they might even learn to raise prices in anticipation of rises in costs. As a result the cost of living would rise. Money wages would therefore be increased again to offset the rise in living costs, particularly if basic wage rates were hitched to an index that reflected these costs, or if important current money wages no longer purchased generally approved minima. When the supply of money became inadequate to sustain this inflationary process, unemployment would increase. Creeping inflation would thus emerge as an employment-restoring corrective for unemployment generated by attempts to increase wages faster than output per man-hour was increasing.[23]

Increases in the wages paid in some industries may disturb what Hicks calls the "hierarchy of wages," a structure which, while somewhat susceptible of change, seems to be thus susceptible only within limits. When these increases do upset this hierarchy, they can set in motion an inflation-generating process, if appropriate monetary conditions also prevail. "If *A*-workers think that their wages should be 10 per cent higher than those of *B*-workers, while *B*-workers think that their wages should be equal to those of *A*-workers, the satisfaction of the claims of one party must necessarily give rise to claims by the other." [24] Suppose output per man-hour increases greatly in *A*-industry but not in *B*-industry and wages are adjusted upward in *A*-industry. *B*-industry workers may then demand a commensurate wage increase, even though productivity has not risen in *B*-industry. If this demand is granted costs will rise in *B*-industry and *B*-prices will move upward, as will the costs of those who purchase *B*-goods. Some unemployment will develop in *B*-industry unless demand for its products has simultaneously shifted upward. Workers in other industries in which there has been much less improvement in productivity than in *A*-industry will also seek wage increases in excess of such improvement in productivity as they may have experienced. In consequence, prices may rise and hence also costs for the users of the products whose prices have risen. As a result, there is a spreading rise in costs, together with few offsets to these rises, and hence pressure upon the cost of living of workers. Unemployment may also develop here and there because of the failure of the monetary demand for different kinds of labor to keep pace with the rise in the prices of labor.

[23] See Abba Lerner, "Immigration, Capital Formation, and Inflationary Pressure," in Brinley Thomas, ed., *Economics of International Migration* (London, 1958), pp. 56–58; also Hicks, *op. cit.*, pp. 91–95.

[24] *Ibid.*, pp. 96–97, 139, 147, 155.

In what has been said a sharp distinction has not been made between demand-pull, cost-push, and other forms of price inflation. Our concern is not with the detailed analysis of the causes of postwar inflation, of which there are a variety of explanations that differ somewhat in respect of the "causes" taken into account, the weights assigned different "causes," and the mechanisms underlying price and wage increases and the incidence and spread of these increases. Nor is it with international differences in dependence upon external trade, a matter of less concern to the United States than (say) to the United Kingdom, though of theoretical and administrative significance in so far as external relations condition internal policy alternatives. What is of importance in the context of this essay is that prices have risen, and that prices are likely to continue to rise unless appropriate countervailing steps are taken. For while the strength of trade unions apparently is no longer increasing as in the 1930's and after World War II, and while this strength varies and could even decline, the unions remain strong and can often secure wage increases in excess of improvements in output per man-hour. The state is committed to something like "full" employment and hence to the occasional introduction of expansionist monetary and fiscal policies intended to bring about "full" employment, and sometimes employment so "full" as to prevent as much competition and flexibility as are essential to the effective working of the economy. Such action is taken for granted by unions and employers, as is continuing increase in output per man-hour. It is much more probable, therefore, that prices will rise than that they will remain stable or decline, particularly since many of the price indexes that affect policy disregard improvements in the quality of products, and hence are biased upward.

While there is considerable difference of opinion respecting the manner in which inflation-generating mechanisms work and the role played by trade unions, various types of evidence have been assembled. For example, workers in industries with relatively small increases in productivity often receive wage increases nearly as high as those of workers in industries with large increases in productivity, usually with the result that prices rise much more in the less productive than in the more productive industries.[25] Output per man-hour increases at quite different rates from industry to industry.[26] There is seemingly convincing evidence also that while the power of trade unions tends to be exaggerated, they can influence money wage movements significantly.[27] Furthermore, trade unions appear to endorse and to act upon the principle that the relative position of a group of workers in the wage hierarchy may be worsened only within limits, as well as upon the supposition that real wages must rise, particularly if an industry is enjoying technical progress or rising profits. Even so, this combination of circumstances could not give rise to inflation unless the quantity of money were increased sufficiently to support an inflationary process.[28]

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[25] E.g., see J. M. Clark, *Competition as a Dynamic Process* (Washington, 1961), pp. 439–446.

[26] Kendrick, *op. cit.*, pp. 161–162.

That the quantity of money will be sufficiently increased to do this probably can be taken for granted. As C. B. Hoover points out, governments no longer dare allow depressions or recessions to reduce money wages materially.[29] When cyclical unemployment begins to manifest itself, governments sometimes initiate anticipatory preventive action which in the end serves to increase wages and prices after an upswing has gotten under way. When increases in unemployment have been facilitated by increases in wages, governments tend to resort to deficit financing in order to create work for the unemployed and to support them until they are re-employed. In this sort of politico-economic milieu, therefore, resistance to price and wage increases is progressively weakened and conditions making for inflation tend to become conjoined.

Under the circumstances an inflation-prone economy could come into being. More and more automatic price-increasing mechanisms might be built into the economy: e.g., escalator clauses, improvement clauses, wage and employment guarantees, expenditure-increasing arrangements, and so on. The factors which have served to stabilize economies in the past—price and wage rigidities, the supposition that prices have normal levels above which they do not permanently rise, and so on—would be progressively dissipated. The elasticity of price expectations might then often rise until it equaled or exceeded unity, and rising prices might come to be looked upon as normal.[30] This trend can be checked, of course, but not so long as the apparatus of state is periodically employed to undergird and feed inflation instead of to check it. This trend can be checked only if public opinion is sufficiently opposed to inflation, for then monetary-fiscal restraints are likely to be introduced and firms facing unwarranted wage demands will have greater incentive to resist such demands, particularly if they are not free to pass wage-increases on to consumers in the form of price increases.[31]

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[27] See Robert Ozanne, "Impact of Unions on Wage Levels and Income Distribution," *Quarterly Journal of Economics*, 73 (1959), pp. 177–196.

[28] On the causative role of the quantity of money in cost-push inflation see Miles Fleming, "Cost-Induced Inflation and the Quantity Theory of Money," *Economic Journal*, 71 (1961), pp. 512–520.

[29] See C. B. Hoover, *The Economy, Liberty and the State* (New York, 1959), pp. 228–229.

[30] J. R. Hicks, *Value and Capital* (London, 1948), chap. 21.

d. *The Labor Standard and the Purchasing Power of the Aged*

When an economy is on a Labor Standard, those who have this commodity to sell are quite secure against the dissipation of the purchasing power of their earnings. Those who draw their money income in the form of variable profits and rents may be relatively secure against the adverse impact of inflation, at least in so far as rising money wages do not eat unduly into rents and profits. Those who derive their money income from instruments and claims that yield fixed benefits or fixed amounts of interest are most exposed to the depreciating impact of inflation. The aged typify this class of income-receivers, for they derive somewhat less than half their money receipts from the sale of their labor, and this fraction is diminishing. They derive somewhat more than half of their cash income from sources which, as a rule, yield relatively fixed amounts, and this fraction is increasing. The purchasing power of the income of the aged is becoming ever less immune, therefore, to the inflationary impact of a monetary policy associated with a Labor Standard. Even the purchasing power of the small amounts that the aged draw in the form of rents and profits can be adversely affected by inflation, though less so than their contractual incomes.

What has been said may be put somewhat differently. In a society based upon a Labor Standard, the aged are particularly vulnerable to rising monetary and real costs. They already draw less than half their cash income from the sale of that commodity, labor, whose exchange value tends to be guarded in an economy based on a Labor Standard. Moreover, as time passes they will draw a declining fraction of their income from the sale of labor and an increasing fraction from other sources, most of which are vulnerable to inflation. The aged could also be relatively more vulnerable than others in an economy based on a Labor Standard, should they have to purchase relatively large amounts of labor-oriented goods and services, the money prices of which are particularly prone to rise in such an economy. Finally, being less mobile than younger workers, older persons who continue to work are underrepresented in well-paying, newly emerging industries. The behavior of the aged's earnings, reflecting this changing industrial composition of older worker employment, was described in an earlier article in this volume.

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[31] A. J. Braff and R. F. Miller, "Wage Price Policies under Public Pressure," *Southern Economic Journal,* 28 (1961), pp. 163–173; also Hoover, *op. cit.*, pp. 228–231.

3. THE WAY OUT

It may be argued that of the various ways in which the aged could share in the national income, some are preferable to others, and one might even be considered optimal. Which sharings are deemed preferable depends upon the criteria that govern, upon the social welfare function that is being maximized. Our concern is not with the criteria that may be assumed to govern—this is a different ethical concern from that dealt with here. Our concern is rather with two threats to optimum participation on the part of the aged in the national product, given many though not all possible definitions of optimum participation. The first of these threats flows from inflation, and the second is present even in the event that both inflation and intolerable amounts of unemployment are simultaneously avoided.

a. *The Threat of Inflation*

Inflation affects the economic condition of the aged more adversely than that of other large groups because the aged derive so much of their money income from essentially fixed-income claims. It matters not to the aged on income grounds whether the inflation is demand-pull or cost-push or otherwise in character; their purchasing power is dissipated in any event. Their concern is to have the purchasing power of their incomes guarded against the eroding impact of inflation, particularly when, even in the absence of inflation, the prices of some of the items preferred by the aged (e.g., personal and medical services [32]) tend to rise because demand for them is increasing faster than their supply.

It may matter somewhat on policy grounds, of course, whether inflation is of the demand-pull type which has predominated since the war, or of the cost-push type which, though present in varying degree, has usually been less important. For the underlying processes differ somewhat even though the Labor Standard always plays a major role, operating sometimes to compensate for rising living costs and sometimes also to re-establish order in a hierarchy of wages initially disturbed by the uneven incidence of cost-reduction or demand-expansion. Because the processes differ, what methods of control are most appropriate may differ somewhat, though orderly control of the growth of the money supply will always be of primary importance.[33] Of particular concern are certain ideas now current, given that today's ideas shape tomorrow's policies. It now seems to be widely held, though supporting theory as well as long-run historical substantiating data are lacking, that creeping inflation is essential to "full" employment and commensurate economic growth, instead of being a deterrent to both. It apparently is supposed that, with trade unions so powerful, the exercise of this power will keep average money wages increasing so much faster than output per man-hour that intolerable amounts of unemployment will emerge unless the money supply is increased at a rate making for continuing inflation.[34] Should policy in the future be based upon this set of suppositions, ideas, and expectations, the purchasing power of the income of the aged could decline rapidly. It remains to be seen, of course, whether any rationally organized and advanced state will elect this policy.

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[32] E.g., see Markley Roberts, *Trends in the Supply and Demand of Medical Care*, Study Paper No. 5, prepared for consideration by the Joint Economic Committee, 86th Congress, 1st session (1959), pp. 48–50, 67–73.

b. *Non-Participation in the Fruits of Technical Progress*

Even if the prices paid by the aged remained virtually stationary, or merely changed in such a way that the money cost of a representative aged person's living budget did not change, the relative economic condition of the aged person would worsen as he grew older. In such a society the purchasing power of the money incomes of the aged would stay put and so would their real incomes if, as has been indicated, the money incomes of the aged, especially of those in or beyond the upper sixties, were drawn predominantly if not entirely from fixed-income instruments. The aged would not be able, therefore, to share in the fruits of technical progress; these fruits, though not properly imputable to labor and capital and related inputs as conventionally measured, tend to be distributed largely as wages, salaries, profits, and rent.

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[33] See C. L. Schultze, *Recent Inflation in the United States,* Study Paper No. 1 in the series referred to in note 32; also Fleming, *op. cit.;* also Council of Economic Advisors, *Annual Report* (1962), pp. 169–185, and F. Machlup, "Another View of Cost-Push and Demand-Pull Inflation," *Review of Economics and Statistics,* 48 (1960), pp. 125–139. See also Machlup's testimony in *Hearings* before the Joint Economic Committee of the United States, 86th Congress, 1st session, pursuant to S.Con.Reg.13 (1959), pp. 2819–2831; A. H. Conrad's Study Paper No. 9 in *Study of Employment, Growth, and Price Levels,* prepared for the Joint Economic Committee, 86th Congress, 1st session (1959).

[34] See P. A. Samuelson and R. M. Solow, "Analytical Aspects of Anti-Inflation Policy," *American Economic Review,* 50 (1960), pp. 177–194, esp. pp. 192–194; A. W. Phillips, "Employment, Inflation and Growth," *Economica,* 29 (1962), pp. 1–16, esp. 14–15. Phillips' interpretation has been criticized by J. R. Bhatia, "Unemployment and the Rate of Change of Money Earnings in the United States, 1900–1958," *Economica,* 28 (1961), pp. 286–296 and Guy Routh, "The Relation between Employment and the Rate of Change of Money Wage Rates: A Comment," *ibid.,* 26 (1959), pp. 299–315. See also Stanley Lebergott's report in *Hearings* (cited in note 33), (1959), pp. 577–585. Also F. W. Paish, "Output, Inflation and Growth," in *Studies in an Inflationary Economy* (London, 1962).

As has been noted, something like half the increase in American output over the past seven decades has been attributable to increases in the efficiency with which inputs were used—to technical and organizational progress. In the more recent period 1940–57, real gross national product in the private domestic economy increased about 104 per cent while inputs increased only two-fifths as much or less; persons engaged and man-hours increased 34 and 20 per cent, respectively, while capital inputs and an index of labor and capital inputs combined increased 65 and 39 per cent, respectively.[35] It has been estimated also that over three-quarters of the increase in output per man-hour in the private, non-farm sector in 1909–49 is attributable to technical progress.[36] Two difficulties are associated with these estimates. The residual growth attributable to sources other than increases in inputs may be imperfectly estimated,[37] and the strategic importance of growth of capital may be underestimated.[38] But these difficulties lie outside the scope of this essay, particularly since they do not affect the empirical basis of our argument appreciably.

The fruits of technical progress have been distributed largely in the form of wages, salaries, profits, and rents. The aged have been able to participate in this distribution only in so far as they have drawn their money income from sources sharing in these fruits. Accordingly, in a technologically progressive society in which the price level

[35] See Kendrick, *op. cit.*, pp. 60, 338.

[36] R. M. Solow has estimated that about seven-eighths of the increase in gross private, non-farm output per man-hour in 1909–49 was attributable to technical change and the remaining one-eighth to increased use of capital. See "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics*, 39 (1957), p. 320.

[37] E.g., see E. D. Domar, "On the Measurement of Technological Change," *Economic Journal*, 71 (1961), pp. 709–729.

[38] E.g., see Leif Johansen, "A Method for Separating the Effects of Capital Accumulation and Shifts in Production Functions upon Growth in Labour Productivity," *ibid.*, 71, pp. 775–782.

is constant and the aged draw most of their money income from fixed-income instruments or claims, the relative economic position of a representative aged person will grow worse insomuch as his income fails to rise while the incomes of non-aged rise. For the sake of expositive convenience, let us suppose two individuals: *A* who retires at 65 has a fixed income of 100 units; *B,* aged 40, also has an income of 100 units derived solely from the sale of his labor, but, unlike *A,* he experiences an increase of 2 per cent per year in this income in virtue of his participation in technical progress and increase in capital per man-hour. Let us suppose also that of this annual increment either 1 to 1.5 units is attributable to technical progress. Then the income of *A* and the income of *B* will progress through time roughly as follows, with the assigned progress of *B*'s income turning on whether the annual contribution of technical progress is 1.0 or 1.5 per cent and on whether the contribution of both technical progress and capital are included:

Year	Income of *A*	Income of *B*		
		(1.0)	(1.5)	(2.0)
0	100	100	100	100
5	100	105	108	110
10	100	110	116	122
15	100	116	125	135

A's position steadily declines vis-à-vis that of *B* and presumably this decline makes for diminution in the amount of satisfaction that he draws from his income; even if he is a Jones he will not be able to keep up with the young Joneses.

Should *A* be enabled to participate in the fruits of technical progress even though his income is fixed as has been supposed? Is *B,* together with those who derive their incomes from sources (i.e., wages, salaries, profits, rents) into which the fruits of progress immediately flow, entitled to the whole of these fruits of progress while *A* gets nothing? The answer depends, of course, upon the criteria one employs in arriving at an answer. The answer would appear to depend in large part, however, upon the source of the increase in income associated with technical progress and upon whether this increase is wholly or partly imputable to identifiable inputs whose ownership is determinable. The issue is of the sort Henry George had in mind when writing of socially created site rent, or of the sort the Fabians had in mind when they wrote of socially created values. May the aged as well as others share in output which is the accomplishment of the community as such?

Some but by no means all of technical progress is imputable to those who presently garner its fruits. Technical progress is largely the result of the application of accumulating scientific knowledge, an essentially communal product, together with improvement in the human factor and residual forces which may be assembled under the head of "increasing return." It would be possible, if relevant data were adequately recorded, to trace increments in output (albeit roughly) more fully than at present to inputs specifically devoted to increasing both education per head and the store of income-increasing scientific knowledge, together with the application of this knowedge in the form of invention and innovation. For the present, however, such careful imputation is not possible, nor is it possible to estimate with high accuracy what part of the unexplained residual attributed to technical progress is traceable to public as distinguished from private investment. We shall arbitrarily assume, therefore, that technical progress traceable to public investment in education, research, invention, innovation, etc. serves to increase in income per adult at least 1.0 per cent per year. Careful study might determine if this assumed rate is too high or too low. It will be employed, however, in the suggestion made below for enabling the aged to participate more fully in the fruits of technical progress than they are likely to do under present circumstances. It would be possible to determine the rate more accurately, and also to compare the results with estimates of what would ensue if the theoretically and administratively most attractive distributive method were employed, namely, diffusing the fruits of progress entirely through cost and price reductions.

4. POSSIBLE SOLUTIONS

The ideal solution for the problems described would consist not merely in the prevention of inflation but also in the distribution of the fruits of progress through cost and price reductions. This solution, it is believed, entails far too high a cost in unemployment under present institutional conditions. The best that can be hoped for is a stable price level. This would be realized if those industries in which productivity was increasing most rapidly (and in which wages were not already unduly low) were to distribute as money income only a portion of their increase in output per man-hour, and in addition gradually cut prices (as they would have to do under the longer-run pressure of competition), with the result that the purchasing power of all money incomes could rise. This solution would entail falling prices in the industries experiencing relatively large increases in output per man-hour and minor price increases in industries experiencing relatively small increases in productivity. It would also permit sufficient profits, internal savings, and investment to allow output per man-hour to increase perhaps 2 per cent per year. The most that is realizable in terms of price stabilization appears to be a situation in which, though some prices rise and others fall, the over-all "level" of prices fluctuates very little.

(1) It should not prove too difficult to enable the aged to participate in the fruits of technical progress even though the over-all price-level remains stable. It is necessary only to establish a suitable Social Credit for the Aged and distribute this credit on an acceptable basis. So doing entails two steps: (i) fixing on the relevant rate of technical progress; (ii) fixing upon a rule that will establish for each retiring individual the base to which this rate is applicable. We have already resolved step (i) by fixing upon a rate of 1.0 per cent per year. We can only suggest and illustrate considerations involved in fixing a rule under (ii), since a variety of possible solutions exist.

When fixing upon (ii) one finds certain limitations indicated. First, a ceiling should be placed upon the extent to which a retired individual may participate in the fruits of technical progress. Let this ceiling base for participation be put, at least for illustrative purposes, at $10,000 for an individual or family head. Second, since old-age benefits consist in capital as well as interest disbursements, a distinction may be in order, though it will be ignored in the illustrations presented below. Third, account must be taken of the age at which retirement takes place; it is possible, of course, simply to fix arbitrarily upon the age 65 (with the exception of retired widows, for whom the year 62 might apply). Fourth, an individual's right to participate should bear some rough proportion to his past and current contribution to the national income. It may be taken for granted that he does participate in so far as he is currently drawing income in the form of wages and profits. It may also be taken for granted that while he is not participating in so far as he is drawing interest income from government or private bonds and savings accounts, these sources should not be included in the base inasmuch as their inclusion might raise serious administrative problems and distort the security price structure. At present, therefore, the most workable basis appears to be the benefits paid out under the Social Security System and the private industrial pension system with which the retiring aged person is affiliated. Conceivably a portion (say not over one-half) of the payments under a private annuity might also be included.

Let us suppose now that a man retires at age 65 and begins to draw benefits aggregating, say $400 per month, or $4,800 per year. In order that he may participate in accordance with the present scheme, it is essential that his income in the second year of his retirement be increased by 1 per cent, his income in the third year be increased by 2.01 per cent, and so on. That is, in his second year of retirement he would receive a supplement of $48.00; in his third year, $96.48; and so on until in his sixteenth year of retirement his supplement would be roughly 16.1 per cent of $4,800, or $772.80. Should our aged person receive an income larger than $4,800, his supplement would be proportionately larger, but subject to the limitation that, even though his annual benefits exceeded $10,000, his benefits in excess of $10,000 per year would not be eligible to this progressive supplement or Social Credit for the Aged. Should an aged person, though his benefits were initially due in his sixty-fifth year, not draw on them until in a later year, the same progressive rate ought to apply thereto, e.g., 5.1 per cent in his seventy-first year, 16.1 per cent in his eighty-first year, and so on. However, should a portion of an aged person's private annuity also be included in the base, a supplement to it probably ought to be reckoned only from the year when the annuity payments begin, if they begin later than in the sixty-fifth year; thus if he began to draw on it in his seventieth year, it would be supplemented only by 1 per cent in his seventy-first year.

It has been suggested that Congress might make appropriate provision for participation by the aged in the fruits of technical progress. This recourse would prove objectionable if Congress merely made provision when and as it saw it fit to do so, and thus subjected itself to political pressure. Congress could, however, gradually work up a set of non-discretionary rules giving expression to the principle of Social Credit more or less along the lines suggested in the three preceding paragraphs. Indeed, it will be possible to work up a satisfactory arrangement only after some experimentation designed to combine simplicity of administration with a fairly careful adjustment of an individual's claims to his past earning power. In many instances a quite simple arrangement may suffice. Thus one might gear to the wage currently prevailing in an industry the social credit due a retired worker long connected with this industry. On the other hand, difficulty might attend the handling of a widow's benefit in the event the widow's income did not parallel that of her deceased spouse.

How should a Social Credit for the Aged be financed? It might be financed out of the personal income tax, or out of this tax, together with the Social Security tax. Presumably the latter arrangement is preferable; a portion, perhaps half, might be raised through additions to the Social Security tax, and the balance through a proportional increase in the personal income tax.

(2) A Social Credit for the Aged, administered somewhat as suggested, would reduce very appreciably the progressive tendency of the real income of the representative aged person to lag behind the steadily advancing average income of the non-aged person in an economy in which the general price level remained stable, even though the price structure underwent change in consequence of changes in technology and in the composition of demand. This Social Credit would not, however, guard the aged against the income-eroding impact of price inflation. This threat to the real income of the aged, as well as to other fixed-income groups, can best be met, not by a series of attempts to offset inflationary movements in the living costs of the various groups, but by concerted efforts to prevent the inflationary price movements from occurring.

There is but limited opportunity for the average individual to guard himself against inflation. An individual with a small income cannot guard himself effectively by purchasing either particular stocks (whose price and earnings often do not keep pace with consumer prices) or a variable annuity. He might, however, have access to considerable protection if the government were to issue index bonds yielding a low interest (say 2.75 per cent) but with the money value of principal and interest hitched to the consumer price index or a similar index.[39] Even so most of the benefit claims of the aged would remain unguarded. It should be noted, also, that measures taken by some European countries—West Germany, for example—to protect the aged's purchasing power from declining with rises in the price level are designed only to offset possible inflationary movements. These schemes do not attempt to allocate to the aged any share of the rising national product, which is the primary aim of a Social Credit scheme.

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[39] On the capacity of the individual to protect himself against inflation, see Study Paper 8 (by H. S. Hourhaker) in the series referred to in note 32 above; also chap. 11 of Paper No. 7 (by S. E. Harris) in the same series.

There is more scope for guarding the aged against inflation by re-establishing a stable price level, a structure of prices in which some fall and others rise in relation to a central value which changes very little. This type of price movement is more conducive to efficient performance on the part of an economy as well as to facilitation of long-run growth than is a slowly rising price level, of the sort approved by those who believe that creeping inflation is inevitable. There are two possible courses of action. First, as Friedman suggests, it may be necessary to require the monetary authorities to "increase the stock of money in the hands of the public at a fixed rate specified in advance" and to require further "that they not alter the rate in response to changes in business conditions." He adds that "the rate of growth chosen should be designed to produce an approximately constant level of prices over the long run" and indicates that the required rate of increase lies between 3 and 5 per cent per year.[40] As of now, he argues, central bankers and money planners lack the data and the instruments that discretionary monetary control involves. So long, therefore, as the conditions essential to discretionary monetary policy are lacking, a fixed mechanical approach appears to be superior.

Second, public opinion might be mobilized against groups which seek to raise their real earnings faster than output per worker is rising in the total economy, as well as against those who seek in other ways to generate inflation. Under these circumstances trade unions would be disposed to keep their wage demands commensurate with over-all productivity increases, employers would be indisposed to yield to higher demands, and governments would find it very difficult to pursue inflationary policies. That public opinion can be so mobilized is quite evident. In 1965, 18 millions of the nation's 115 million persons 21 and over will be 65 and over. When one adds to this number those whose incomes are relatively fixed or difficult to advance rapidly, and those who will soon be moving into the over-65 age group, one gets a number approximating one-half of the adult population. About 29 millions of the labor force (or about 43 per cent) are in the white-collar group at present, and about 17 million will soon be aged 55–64. If it could be supposed that all persons aged over 54 are opposed to inflation, together with three-fifths of the white-collar workers under 54, one gets close to 45 million persons. Adding to this number the spouses of white-collar workers under 55, who would oppose inflation, together with others so inclined, one arrives at a number falling within the range 50–60 millions. It is evident, therefore, that close to one-half the voting population might be mobilized against inflationary measures.

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[40] See Milton Friedman's testimony in *Hearings,* cited in note 33 (1959), p. 3022. His argument is developed in *A Program for Monetary Stability* (New York, 1960), pp. 84–99. Whereas Friedman favors a 4 per cent annual rate of increase in the monetary supply, M. Bronfenbrenner believes that a 3 per cent rate is better suited to give price stability. See his "Statistical Tests of Rival Monetary Rules," *Journal of Political Economy,* 69 (1961), pp. 1–14, and additional comment, *ibid.,* 69, pp. 621–665.

5. CONCLUSION

In the early part of this essay it was shown that the economic situation of many of the aged was quite inferior to that encountered in the population at large. Subsequently, the forces making for inflation were described, together with the past inability of the aged to guard against the incidence of inflation. It was also shown that even though the price level remained stable, most of the aged would not, under present arrangements, be able to share significantly in the fruits of industrial progress. It was then suggested that such participation might be secured through the establishment of a Social Credit for the Aged, assuming that the price level remained stable. It was indicated finally, that since the aged as individuals can do little to protect themselves against inflation, their security must lie in cooperation with other groups who are particularly vulnerable to inflation and hence disposed to oppose it. Inasmuch as close to one-half the nation's adult population is likely to look upon inflation as inimical to its welfare, this group could be knit into an anti-inflation bloc. Were this done, and were a Social Credit established for the aged, their position vis-à-vis that of the remainder of the population, though still inferior, would be quite good. Up to now individuals opposed to inflation have not merged into effective political groups, nor have efforts been made to grant the aged a continuing share in the fruits of technical progress.

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